

MAY 6, 1943

IN TWO SECTIONS—SECTION ONE

The

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3

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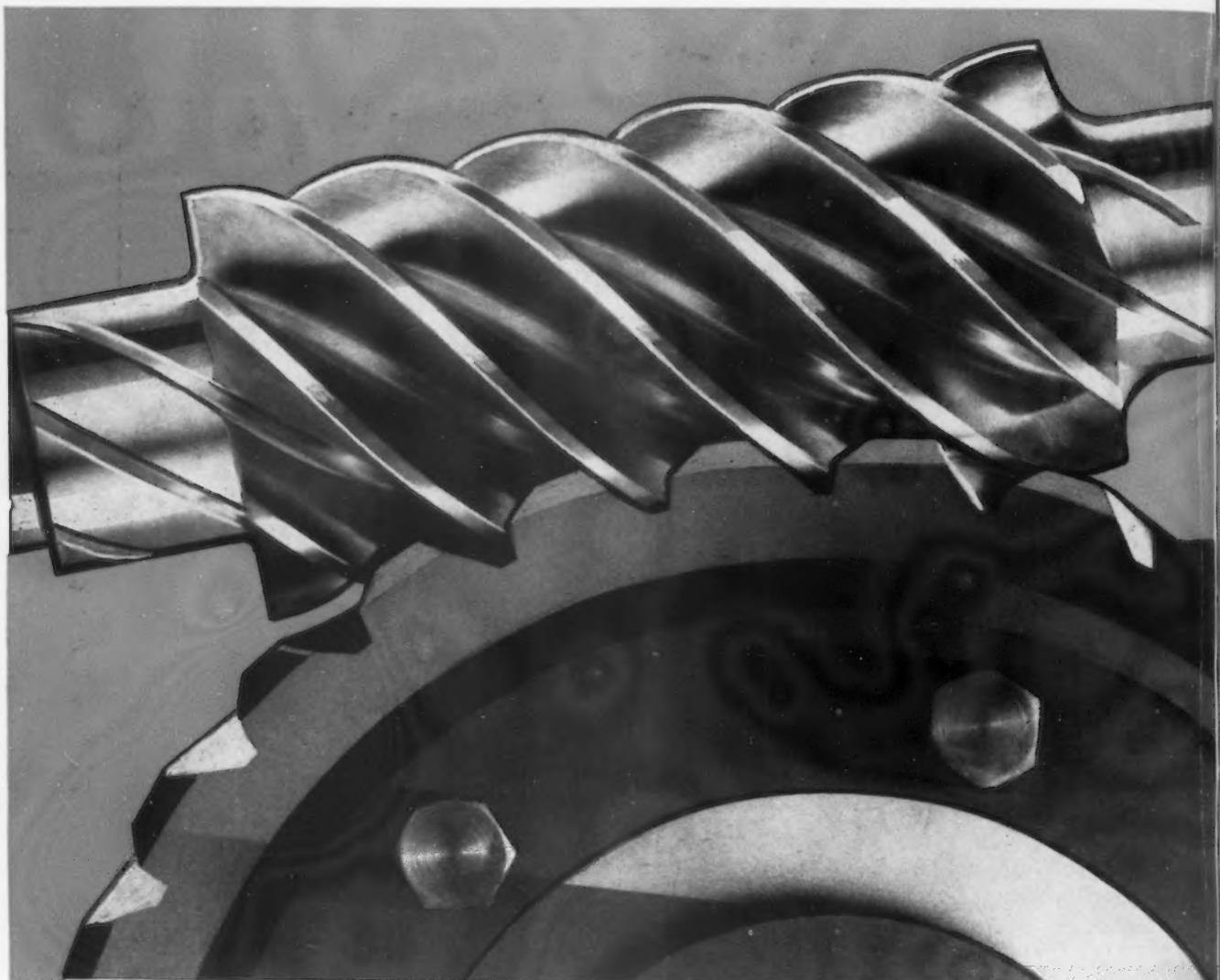
1 ACCURACY IN RAW MATERIALS 2 CONSTANT CHECK OF  
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MAY 6, 1943

VOL. 151, NO. 18



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Member, Audit Bureau of Circulations  
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Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price North America, South America and U. S. Possessions, \$8; Foreign, \$15 a year. Single copy, 35 cents. Annual Number, \$2. Cable Address "Ironage N. Y."

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Owned and Published by  
CHILTON COMPANY  
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Executive Offices Editorial and Advertising Offices  
Chestnut and 56th Sts. 100 East 42nd St.  
Philadelphia, Pa. New York, N. Y.  
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## This Week in ...

# THE IRON AGE

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#### Three Million More for Uncle Sam

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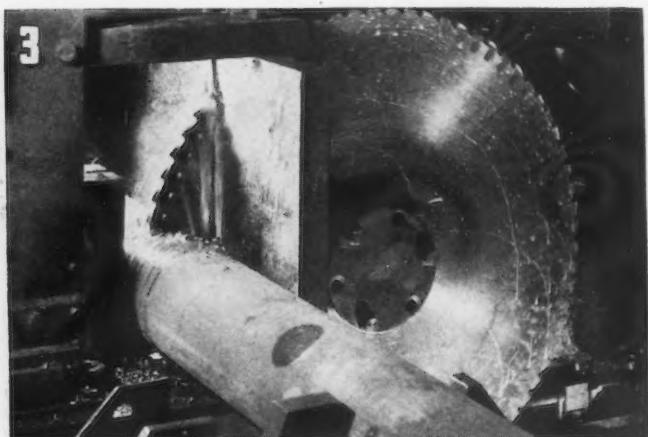
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# THE IRON AGE

MAY 6, 1943

ESTABLISHED 1855



## Three Million More for Uncle Sam

GERMANY is doing all it can, via an incentive plan, to increase her population for the next war. Certainly the rewards for production, or rather for reproduction offered to the women cannon-fodder producers of the swastika states cannot be capitalized for at least 16 or 17 years to come.

America is looking to this war, not to the next. And what we need in this country to solve the impending labor and military demands is the creation, almost at once, of some three million more fighting and working men and women. Not the creation of babies for the next war but of adults for this.

I realize that a proposal to create, almost overnight, this additional potential of three million workers and fighters sounds fantastic. But actually it is as simple as the nose on your face, providing that feature runs to the simple rather than to the complicated pattern. All that is required is the laying aside of some precedents and prejudices and the application of some already well established principles and practices.

Experience has shown industry that beyond a shadow of a doubt, you can increase productivity at least 30 per cent by paying producers for what they produce instead of for the hours that they consume. In other words by the application of an incentive system that rewards the worker according to his output.

On page 79 of the preceding issue was a survey made by THE IRON AGE which set forth these facts.

With more than nine million workers engaged in war work at present, a gain of 30 per cent in productivity would be the equivalent of the immediate creation of an additional working or fighting force of three million American men and women. And this additional force would be more than enough to provide industry and agriculture with the people it needs and to relieve the present threatened pressure on many fathers of families by permitting the release of unencumbered workers of draft age to the Army.

Precedent and prejudice alone stand in the way of this.

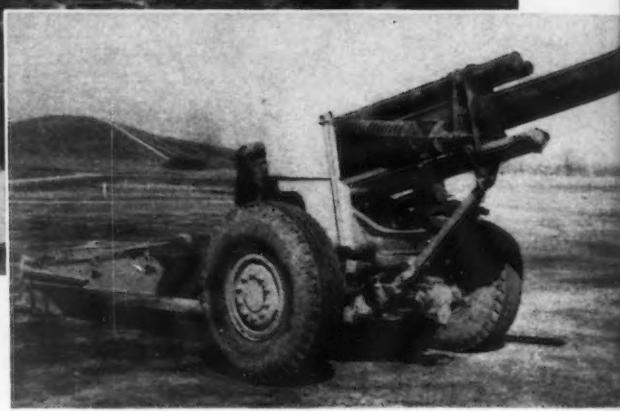
One is the prejudice of union leaders in some industries, who with union dues on a per capita basis do not see the advantage of letting the twice as good producer earn twice as much. This might be cured by putting industrial union dues on the basis of weekly wages.

Another is the bad precedent established by some employers in the old piece-work days, who set their rates by "guess and by God" (principally by guess), and who promptly cut the rates when a man earned more than they thought proper. This can be cured by legislation freezing any established rates for the duration.

Surely prejudice and precedent should not be permitted to stand in the way of the fullest fruition of America's war effort.



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It is easily welded by arc, spot, resistance or flash methods, or by gas.

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# Plain Carbon

## Replaces

## Alloy Steels

By Q. S. JAMESON  
*Works Metallurgist, International Harvester Co.*

**... Shortages of alloying elements have started a trend to plain carbon steels for heat treated parts formerly made from alloys, a switch-over which is assuming big proportions. In this, the first of two articles, the author exhaustively discusses choices of steels and treatments for carburizing grades.**

THE shortage of chromium, nickel, molybdenum, vanadium, and other alloying elements, has started a trend toward the use of plain carbon steels for applications where alloy steels have been considered necessary. The extended use of the national emergency grades is conserving a large tonnage of the important alloying elements; however, the increased use of steel in general still leaves a margin between output and demand.

The substitution or replacement of alloy steels by plain carbon steels presents numerous manufacturing problems. The chief cause of the manufacturing difficulties is the lower hardenability of the plain carbon steels which necessitates the use of water and refrigerated brine as coolants in place of oil in heat treating operations. For example, the cooling rate at the surface of a 1 in. round, water quenched, is approximately 850 deg. F. per sec. at 1300 deg. F. whereas, the cooling rate at the surface using oil would be about 120 deg. F. per sec. This increased cooling rate brings about increased quenching stresses which may result in the development of cracks in the treated parts and certainly increased distortion. The danger of cracking in quenching becomes an engineering problem also, as designs may have to be changed to eliminate marked differences in sections within the same part and the reduction of sharp corners by increased radii tolerances. Engineers must also be prepared for a reduction in physical properties, especially in larger parts.

The buying of plain carbon steel for heat treated parts requires some knowledge of metallurgy as the specifications for plain carbon steel for carburizing must contain more information than is usually required for alloy steels. The majority of alloy steels are sold on a guaranteed performance basis, as steel mill metallurgical service is readily obtainable. It is usually necessary only to specify the SAE or AISI symbol in ordering alloy steel as practically all alloy steels are made with a fine grain size and according to the best mill practice. It is insufficient to order the plain carbon steels by symbol number only, as most specifications for chemical analysis do not include a silicon range which is necessary for satisfactory carburizing properties. The silicon range implies a "killed" steel made under what is known as special requirement quality or special carburizing quality practice. The grain size desired should also be specified, as plain carbon steels are made both coarse and fine grained, or rather in many cases with no grain size control whatever.

The effect of silicon additions on the hardenability characteristics of a plain carbon steel is illustrated in Fig. 1. The effect of the first part of the addition of silicon is to deoxidize, unless some other deoxidizer such as

aluminum is used. In this figure, 1 in. rounds, 3 in. long, quenched in water from 1650 deg. F., were used. The rounds were previously normalized at 1650 deg. F.

It will be noted that with the same cooling rate, which at the center of a 1 in. round would be about 100 deg. F. per sec. at 1300 deg. F., the steel with 0.21 per cent silicon has a hardness of 20 Rockwell C, whereas, the steel containing 0.08 per cent silicon has a hardness of 13 Rockwell C. This difference in hardness would be translated into the core hardness of a carburized and hardened part, and these hardness values would in turn represent tensile strength values obtained in the core of the carburized part.

The effect of the silicon content on the hardenability in the carburized condition is illustrated in Fig. 2, with data obtained from a standard end quench specimen carburized at 1680 deg. F. for 8 hr. and quenched in oil, followed by reheating to 1480 deg. F. and end quenching in water. A description of the end quench test is to be found in the 1942 SAE Handbook.

The effect of the lower hardenability of the 0.04 per cent silicon steel of Fig. 2 would, in the instance of a carburized part, have the effect of decreasing the size of the part which could be effectively quenched and tempered to produce a surface hardness

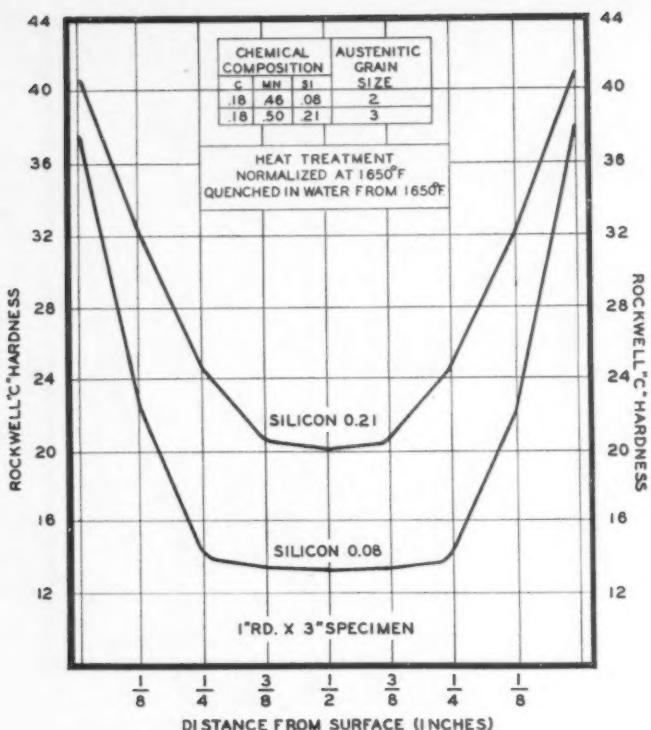


FIG. 1.—The effect of silicon or deoxidation on the hardenability of AISI C 1015 steel.

of 60 Rockwell C minimum. For example, the 0.04 per cent silicon steel would require a cooling rate about 200 deg. F. per sec. faster to equal the 0.20 per cent silicon steel in surface hardness.

Where the silicon content is low, which would often, but not always, represent a heat containing a high percentage of oxygen, since deoxidizers other than silicon may have been used, there is a wide variation in surface hardness. The presence of oxygen is usually determined by the McQuaid-Ehn test, which involves a microscopic examination of the condi-

tion of a carburized and slowly cooled area, and classification by the condition of the pearlite areas which in a normal steel are found close to the carbide network as shown at the left in Fig. 3, whereas in a steel classified as abnormal, well formed pearlite may be almost entirely absent as shown at the right in Fig. 3.

The effect of this condition on the occurrence of soft spots after carburizing is shown in Table I, which covers parts in 3/16-in. sections, made from normal and abnormal steel, from the same heats as were used in Fig. 3, after carburizing at 1680

deg. F. for 5 hr. and box cooling, reheating to 1650 deg. F. and cooling in water (160-170 deg F) followed by reheating to 1450 deg. F. and quenching in cold water, and tempering from 400 to 625 deg. F. at 50 deg. intervals. Altogether 144 parts were tested, involving 12,520 separate hardness readings.

It is possible to minimize or perhaps eliminate this abnormal pearlite condition as illustrated in Table I, by quenching parts in refrigerated brine. The improvement is accomplished not only by the increased cooling rate, due

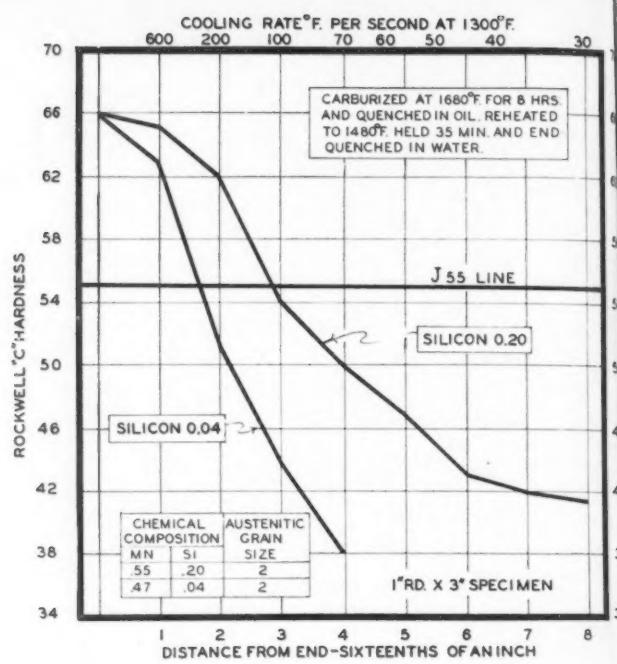


FIG. 2.—The effect of silicon or deoxidation on the hardenability of AISI C 1015 steel.

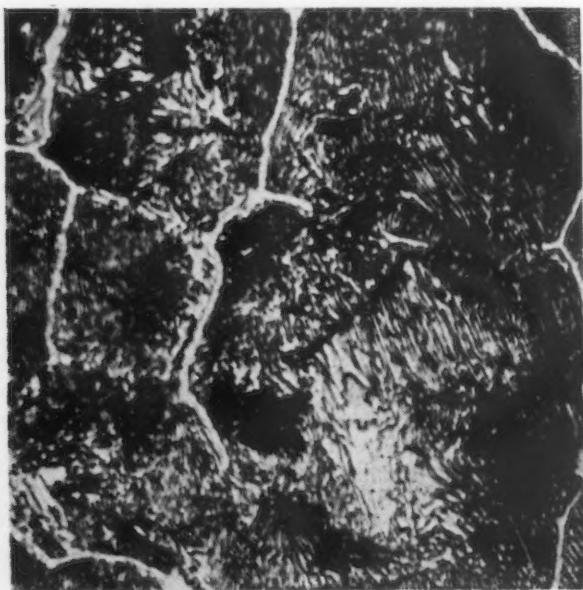


FIG. 3.—The photomicrograph at the left shows a normal steel, with pearlite areas close to the carbide network. At the right is an abnormal structure, with well formed pearlite almost entirely absent. Both specimens are nital etched, enlarged to 500 diameters.



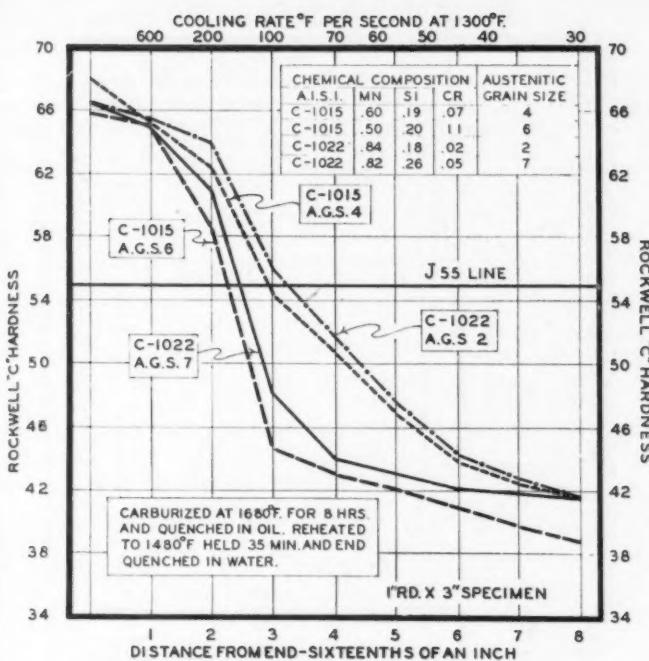


FIG. 4—Effect of austenitic grain size on the hardenability rating of carburizing steels.

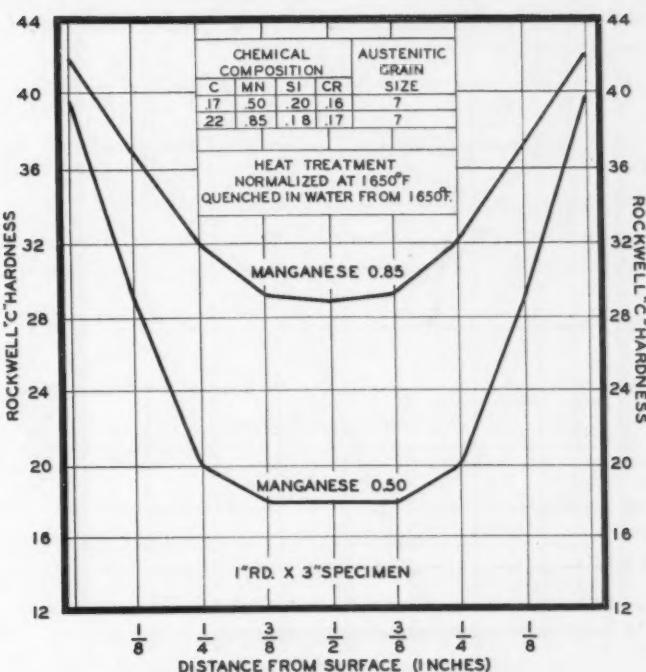


FIG. 5—Effect of manganese on the hardenability of AISI C 1015 steel.

to the lower temperature of the quenching medium, but also by the effectiveness of the brine solutions in preventing the formation of steam or vapor pockets on the surface of the steel during the first stage of quenching.

So much has been written on the subject of the abnormality of steel especially in technical literature of the late '20's, that it seems unneces-

sary to discuss it further here, except to state that an abnormal steel is unsuitable for carburized parts, and specifications for a plain carbon steel should exclude this condition. It is unlikely, however, when a silicon content of 0.15 to 0.30 per cent is specified that the steel would be abnormal.

Now as to the effect of grain size. By grain size is meant the grain size after carburizing a sample of steel for

8 hr. at 1700 deg. F. The practice and the manner of rating the grain size is covered by ASTM E-19-39T or in the SAE 1942 Handbook.

Fig. 4 illustrates the effect of grain size on the hardenability as recorded by a carburized, end quench specimen. A fine grained steel of the same chemical composition requires a cooling rate about 100 deg. F. per sec. at 1300 deg. F. faster than a coarse grain

FIG. 6—Frequency distribution curve of 46 heats of AISI C 1015 steel, fine grain, containing 0.14 to 0.19 per cent chromium.

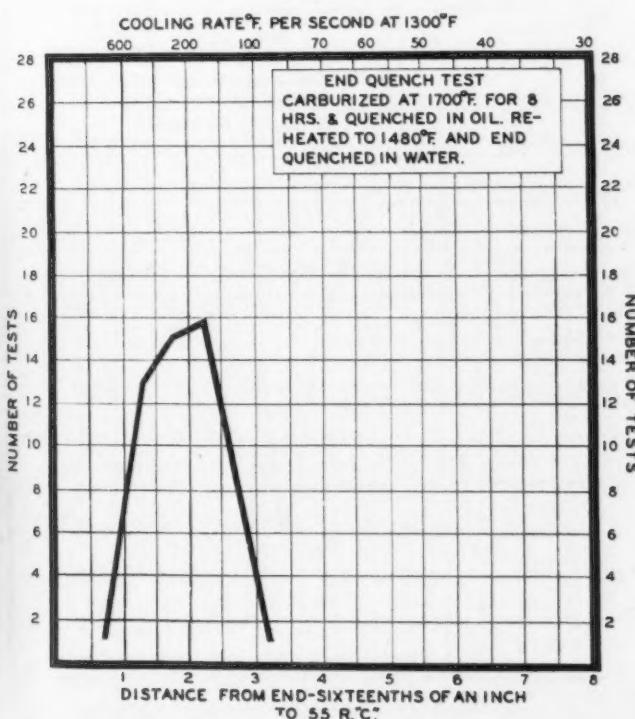
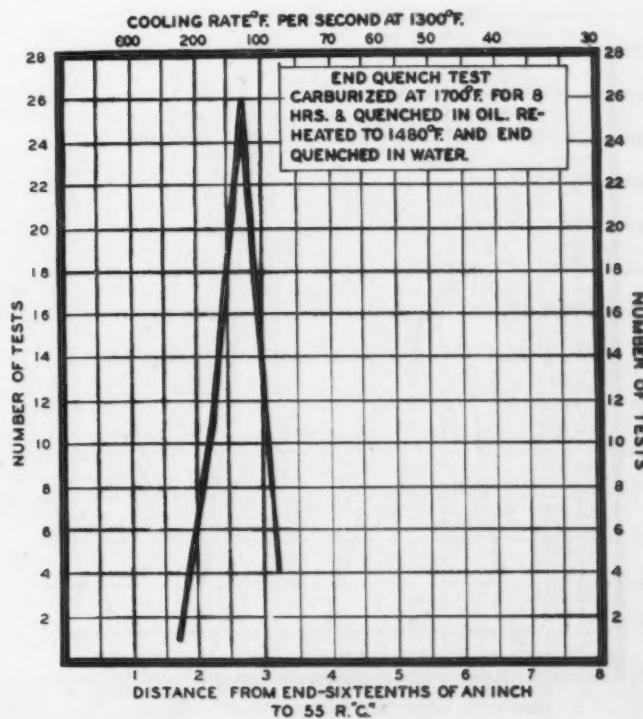


FIG. 7—Frequency distribution curve for 41 heats of AISI C 1022 steel, fine grain, containing 0.14 to 0.19 per cent chromium.



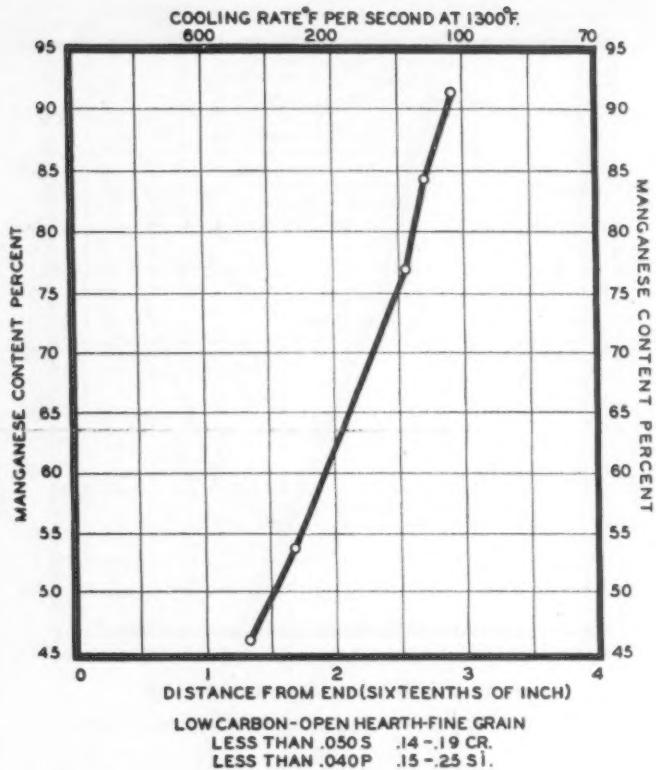


FIG. 8—Effect of manganese content on hardenability of carburized steel.

steel to produce a part of satisfactory hardness, say 60 Rockwell C.

Though it has been proved that a coarse grained steel can be cooled at a slower rate and yet produce the same hardness as a fine grained steel, coarse grained steels are not neces-

sarily the most popular choices for carburizing steel. Certain disadvantages accompany the use of a coarse grained steel. This type of steel has a greater tendency to have surface seams, which means higher chipping costs in preparing blooms or billets

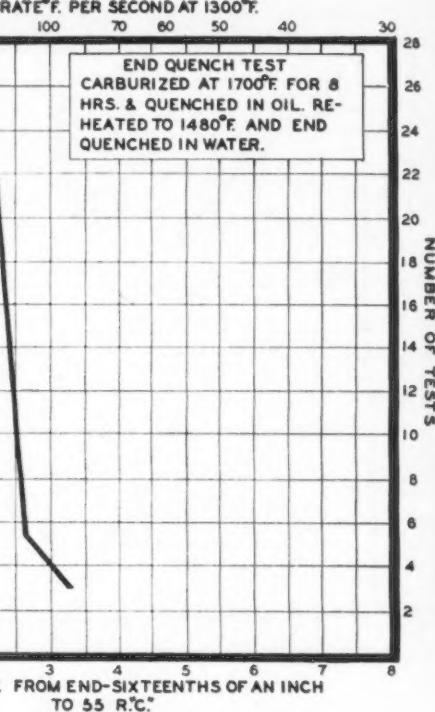


FIG. 9—Frequency distribution curve for 42 heats of AISI C 1022 steel, fine grain, containing less than 0.10 per cent chromium.

for subsequent rolling operations in the steel mill. Also, a more brittle structure is often encountered in hardened parts due to an enlarged grain size.

The lower impact value of a coarse grained steel is illustrated in Table II.

FIG. 10—Frequency distribution curve for 53 heats of AISI A 4119 steel, fine grain.

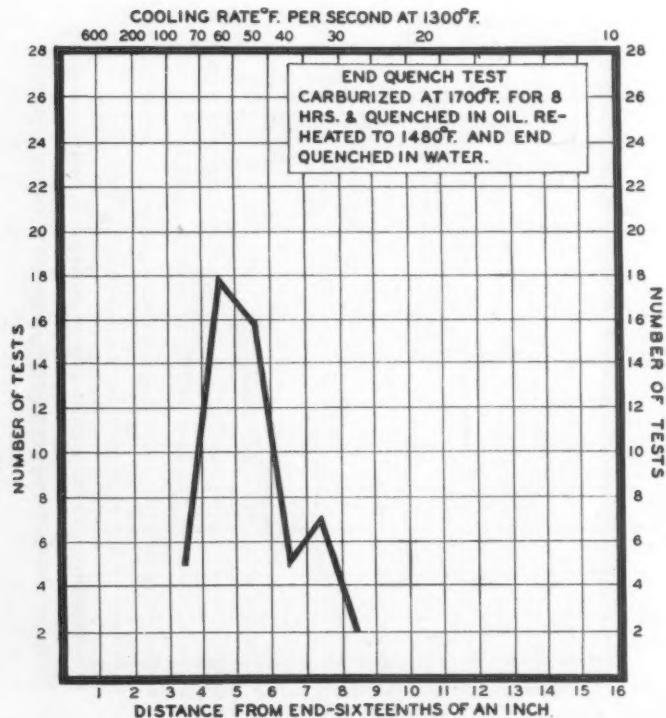
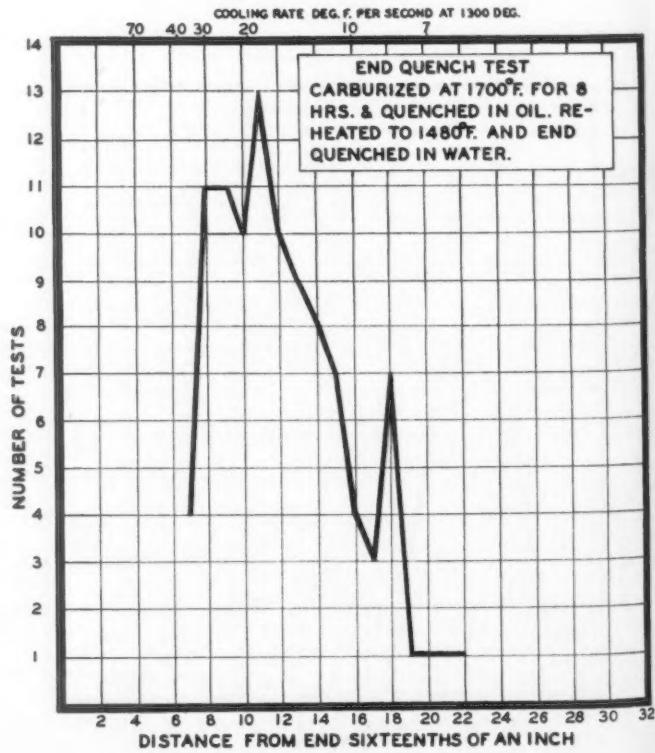


FIG. 11—Frequency distribution curve for 100 heats of AISI 4620 steel.



The disadvantages of using a coarse grained steel practically eliminate this grade of steel as a substitute for an alloy steel, and on the other hand a fine grained steel, C 1015, is so much inferior in hardenability to a coarse grained steel that it also is undesirable except for very small section parts, say under  $\frac{1}{4}$  in. in thickness.

It therefore appears desirable to increase the manganese content of the fine grained C 1015 to offset the reduced hardenability over coarse grain C 1015, manganese being at present the only element which is not too severely restricted. This means the selection of AISI C 1022, a manganese range of 0.70-1.00 as compared with a 0.30-0.50 range for AISI C 1015.

The effect of manganese on the hardenability as shown by a 1 in round, 3 in. long, quenched in cold water from 1650 deg. F. is illustrated in Fig. 5, showing that at the center of a 1 in. round, which has a cooling rate of about 100 deg. F. per second at 1300 deg. F., the hardness obtained is 29 Rockwell C for a steel containing 0.85 manganese and 17 Rockwell C for a steel containing 0.50 manganese. This difference in hardenability would be evident in the core of a carburized and hardened part.

The effect of manganese in the carburized condition is shown by comparing Fig. 6 with Fig. 7. Data were obtained from standard end quench specimens.

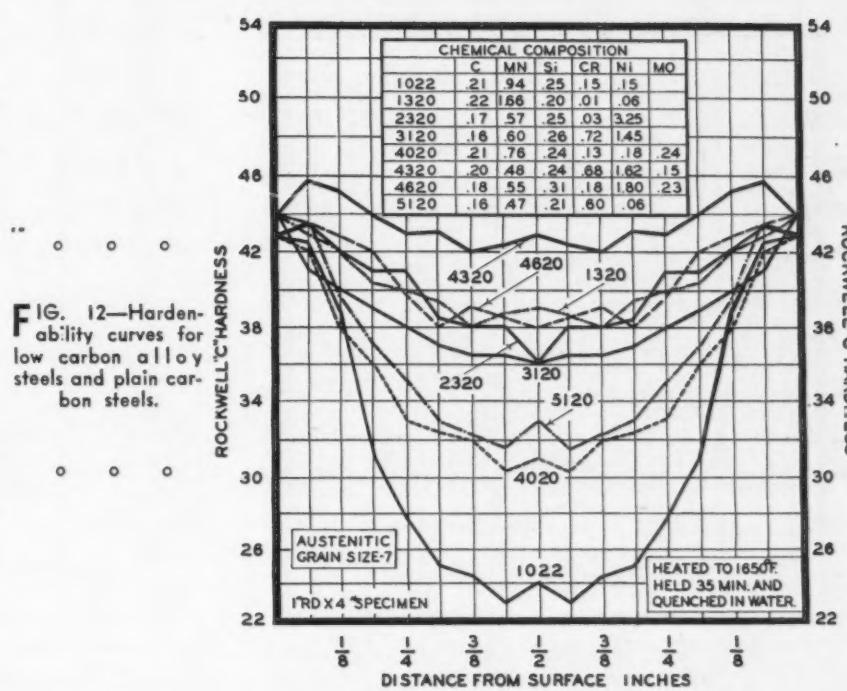
It will be noted that the C 1022 steel has a smaller spread than the C 1015 and that the C 1022 steel has a greater J-55 value than C 1015. In other words a faster cooling rate would be required to produce the same hardness for a C 1015 part than would be required for a C 1022 part. This would, however, have practical significance only in determining the maximum section of parts which could be quenched to produce a satisfactory surface hardness.

Fig. 8 also shows the effect of increasing manganese contents on the hardenability of carburized steel as determined by the end quench test using a J-55 value as a basis of comparison.

It will be noted that the steels in Figs. 6 and 7 contain a chromium percentage of 0.14 to 0.19 per cent.

This small amount of chromium can affect the hardenability favorably as can be seen by comparing Fig. 9 with Fig. 7. Due to the shortage of chromium, this is perhaps not a desirable addition at the present time. It does, however, show what can be expected by the presence of residual chromium in plain carbon steel.

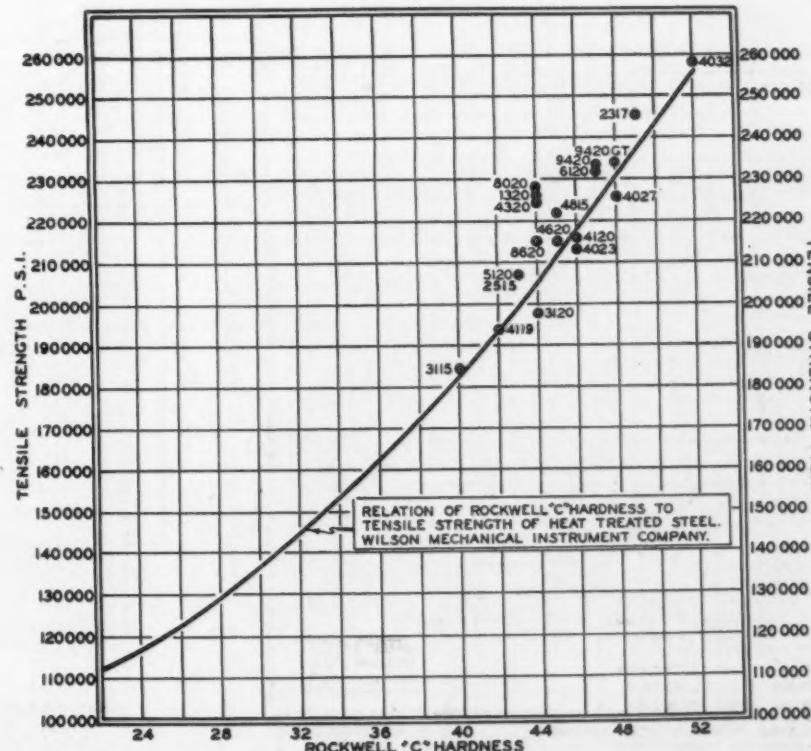
Comparing the plain carbon steel



under the most favorable condition, that is, using AISI C 1022 with 0.70-1.00 manganese range and a chromium content of 0.14 to 0.19 per cent, there is a wide gap in hardenability between this steel and previously commonly used alloy steels such as AISI A 4119 and also AISI 4620 as is illustrated by comparing Figs. 10 and 11, which show carburized end quench test data for 4119 and 4620 steels, with Fig. 7.

A comparison of Figs. 10 and 11 with Fig. 7 shows that a J-55 rating of  $4\frac{1}{2}$  for 4119 and 10 for 4620 is to be expected as against  $2\frac{1}{2}$  for C 1022. In practice this means that in the case of C 1022, a carburized part  $\frac{3}{4}$  in. in diameter could not be oil quenched to produce a satisfactory surface hardness, whereas a similar part made from 4119 or 4620 could be oil quenched to produce a satisfactory

FIG. 13—Tensile strengths of low carbon alloy steels and plain carbon steel, vs. Rockwell C hardness.



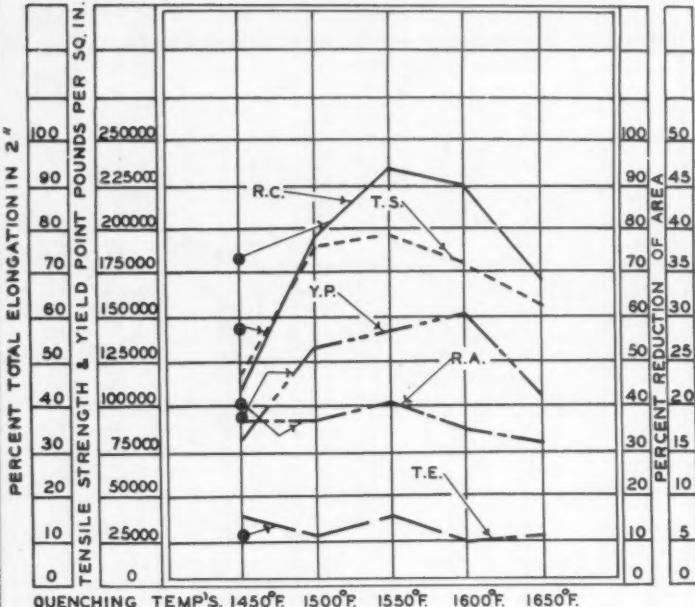


FIG. 14—Tensile properties obtained by water quenching 0.525 in. test bars of C 1022 steel.

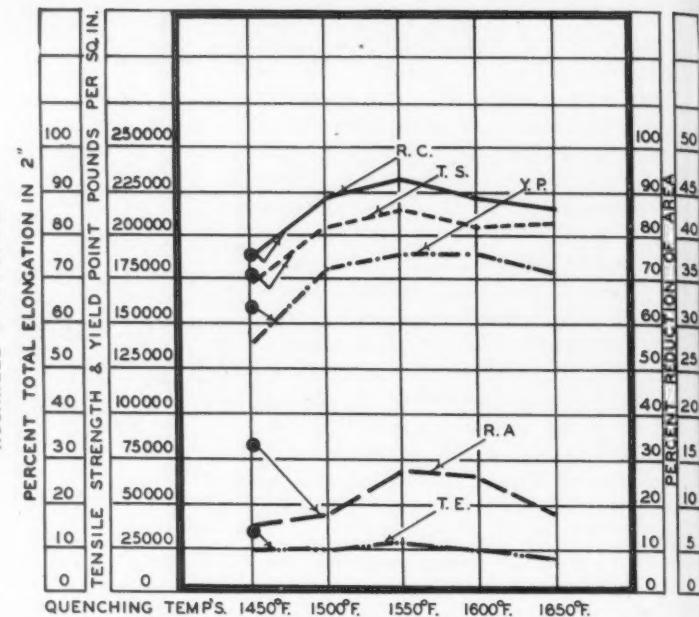


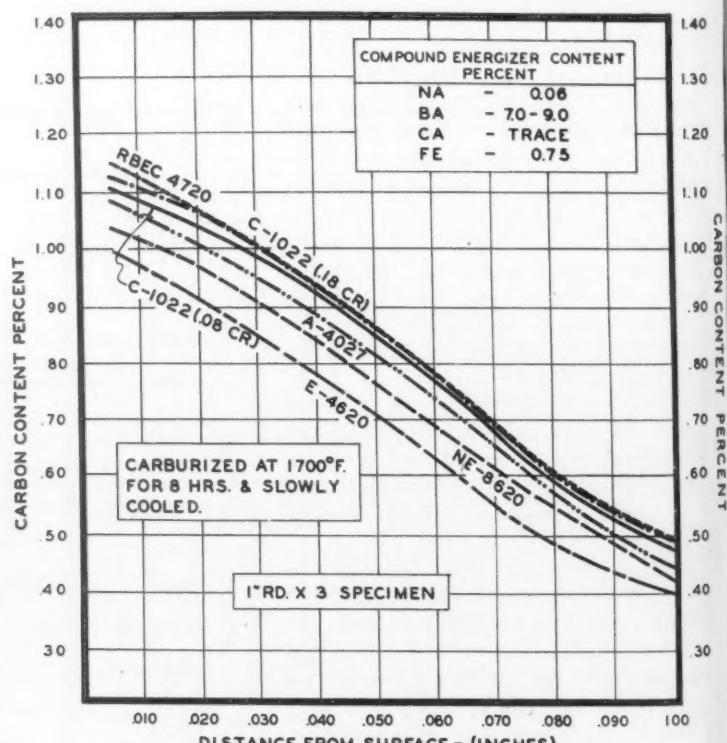
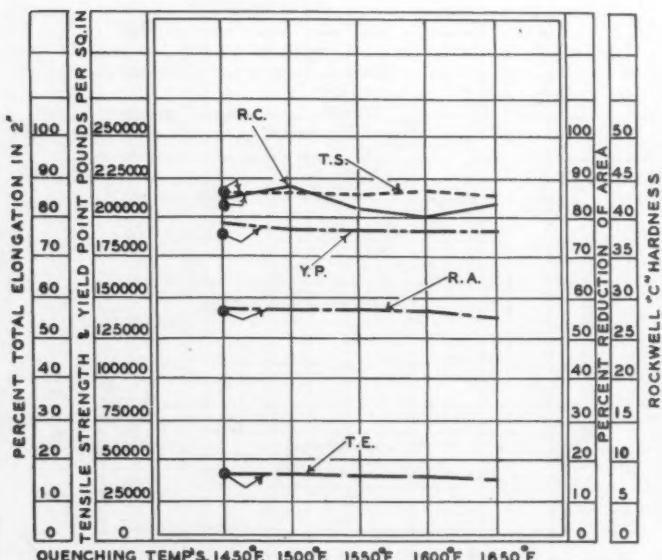
FIG. 15—Tensile properties obtained by water quenching 0.525 in. test bars of 4023 steel.

RIGHT

FIG. 17—Carbon curves for 1-in. rounds, box carburized at 1700 deg. F. for 8 hr. and slowly cooled, for C 1022 and alloy steels.

BELOW

FIG. 16—Tensile properties obtained by water quenching 0.525 in. test bars of 4815 steel.



STEEL	C	MN	SI	Ni	CR	MO	AUSTENITIC GRAIN SIZE
C-1022	.22	.76	.22	.17	.08		
C-1022	.20	.89	.24	.01	.18		
A-4027	.28	.78	.29	.11	.11	.23	
RBEC-4720	.16	.55	.31	.127	.22	.22	
E-4620	.20	.53	.24	.168	.14	.22	
NE-8620	.20	.81	.30	.58	.46	.23	FINE

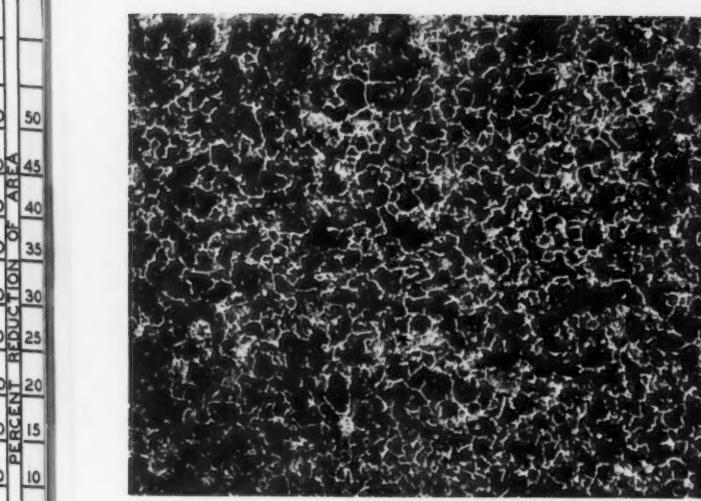


FIG. 18—Photomicrograph showing carbide network in carburized and slowly cooled case. The carbide network is shown against a dark background of fine pearlite. Etched in 2 per cent nital, enlarged to 100 diameters.

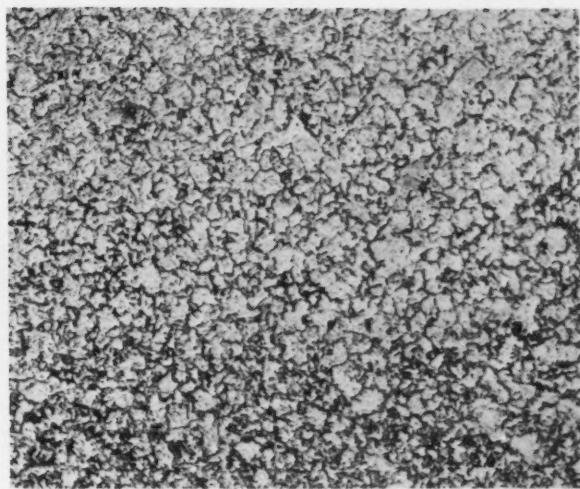


FIG. 19—Photomicrograph of case quenched in hot water, showing structure of martensite and troostite. Etched in 2 per cent nital, enlarged to 100 diameters.

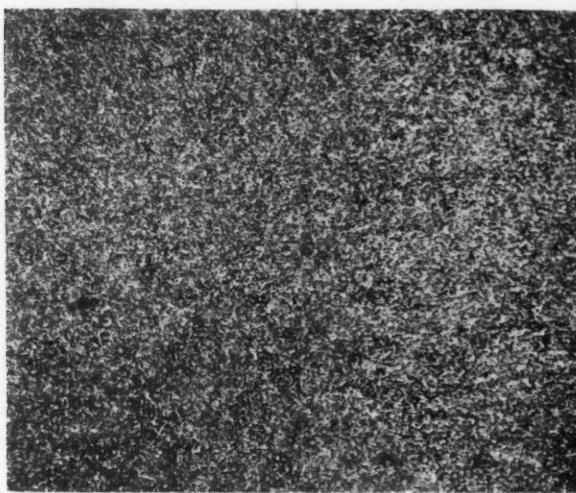


FIG. 20—Photomicrograph showing uniform martensitic case structure produced with final hardening heat at 1450 to 1500 deg. F. after preliminary quench and rapid cooling, preventing precipitation of carbide network in the case. Etched in nital, enlarged to 100 diameters.

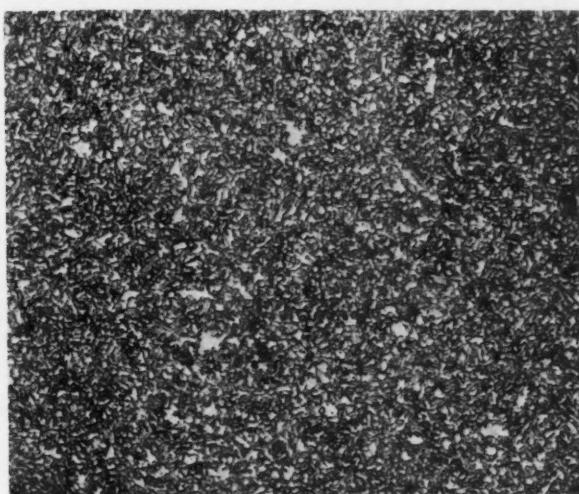


FIG. 21—Photomicrograph showing uniform core structure produced with final hardening heat after preliminary quench and rapid cooling, preventing precipitation of ferrite in the core. Etched in nital, enlarged to 100 diameters.



FIG. 22—Photomicrograph showing case structure after slow cooling from the carburizing operation by a single quench in cold water. Etched in nital, enlarged to 100 diameters.

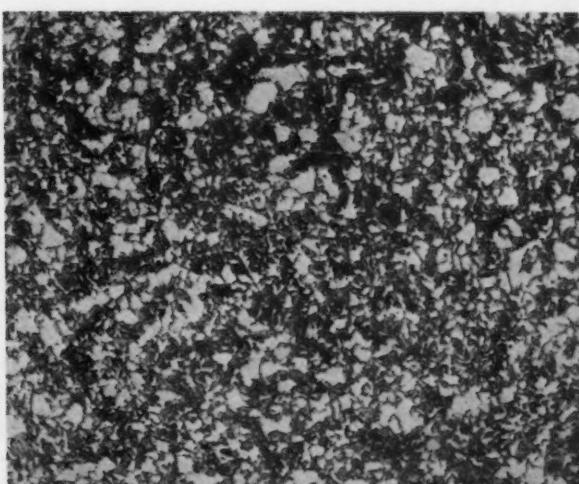


FIG. 23—Photomicrograph showing core structure after slow cooling from the carburizing operation by a single quench in cold water. Etched in nital, enlarged to 100 diameters.

**TABLE I**  
**The Effect of Abnormality on the Surface Hardness of Carburized and Water Hardened Parts**

**Normal Steel**

Tempering Temperature, Deg. F.	Hardness, Rockwell C (average)		Hardness range, Rockwell C (average)		Parts Showing Soft Spots (Percent)	Parts Outside a 7-Point Rockwell C Hardness Range (Percent)	Parts Outside a 10-Point Rockwell C Hardness Range (Percent)
	As Quenched	Tempered	As Quenched	Tempered		Rockwell C Hardness Range (Percent)	Rockwell C Hardness Range (Percent)
625	67	49	3.4	5.8	3	23	6
575	67	50	3.4	4.6	8	8	0
550	67	52	3.5	4.5	0	0	0
400	67	59	3.5	4.8	0	0	0

**Abnormal Steel**

Tempering Temperature, Deg. F.	Hardness, Rockwell C (average)		Hardness range, Rockwell C (average)		Parts Showing Soft Spots (Percent)	Parts Outside a 7-Point Rockwell C Hardness Range (Percent)	Parts Outside a 10-Point Rockwell C Hardness Range (Percent)
	As Quenched	Tempered	As Quenched	Tempered		Rockwell C Hardness Range (Percent)	Rockwell C Hardness Range (Percent)
625	67	48	15.2	8.0	56	40	23
575	67	50	10.4	4.2	41	25	6
550	66	51	15.8	10.9	67	58	40
400	67	59	12.0	11.0	42	40	40

surface hardness of, say, 60 Rockwell C.

A comparison of the difference in hardenability between C 1022 and various alloy steels is also illustrated in Fig. 12 which compares the cross sectional hardness of 1 in. rounds of a number of alloy steels with an AISI C 1022 steel containing 0.15 per cent chromium. Hardness readings half way between the center and the outside of the 1 in. round, which would represent a cooling rate of 135 deg. F.

per sec. at 1300 deg. F., show the steels to compare in hardness as shown below.

C-1022	Hardness, Rockwell C
4020	28
5120	33
3120	35
1320	38
420	40
2320	40
4320	41
	43

Translating these hardnesses into

**TABLE II**  
**Carburized Impact Properties of Coarse and Fine Grained AISI C1015 Steel**

Treatment Carburized at 1700 Deg. F.	Coarse Grained ASTM No. 2				Fine Grained ASTM No. 7			
	Energy Absorbed Ft-Lb.	Hardness, Rockwell C (average)	Case Depth, In.	Fractured Grain Size No.	Energy Absorbed Ft-Lb.	Hardness, Rockwell C (average)	Case Depth, In.	Fractured Grain Size No.
Box quenched in oil, reheated to 1430 deg. F. and brine quenched T-325 deg. F.	7	64	.035	5	17	64	.030	7
Box cooled. Reheated and quenched in oil from 1680 deg. F. Reheated and quenched in brine from 1430 deg. F.—T-325 deg. F.	6	64	.043	5	13	64	.038	7

tensile strength values by means of Fig. 13 gives the following values.

	Tensile Strength lb. per sq. in.
C-1022	130 000
4020	155 000
5120	158,000
3120	170,000
1320	180 000
420	180,000
2320	185,000
4320	200,000

These tensile values are only rough approximations of what could be expected from these steels as cores of carburized parts, for they were obtained by quenching from 1650 deg. F., whereas for C 1022 it is customary to quench from 1450 to 1500 deg. F. for hardening.

The tensile values obtained from quenching a plain carbon steel at 1450 to 1500 deg. F. are noticeably lower than those obtained from alloy steels, as is shown by comparing Figs. 14, 15 and 16, which give tensile properties obtained by water quenching 0.525 in. test bars of C 1022, 4023 and 4815.

The highest physical properties which can be expected from AISI C 1022 steel after quenching in water from 1450 to 1650 deg. F. at 50 deg. F. intervals and also double quenching from 1650 and 1450 deg. F. in a 0.5 in. round section are shown in Fig. 14, which can be compared with similar data for AISI 4023 and 4815 steels (Figs. 15 and 16).

From a comparison of Figs. 14 and 15, it will be noted that plain carbon steel has lower tensile strength values. For example, at 1500 deg. F. which would be a reasonable reheating temperature for a carburized part, the tensile strength for C 1022 is 188,000 lb. per sq. in. and A 4023 is 210,000 lb. per sq. in. when quenched from 1525 deg. F., which is not widely divergent; but the yield point of C 1022 is 130,000 lb. per sq. in., whereas, for A 4023 it is 180,000 lb. per sq. in. which is about 40 per cent higher. A 4023 steel is usually quenched in oil and C 1022 in water; therefore, in actual practice the values for A 4023 oil quenched would be no better than C 1022 water quenched.

But in the instance of 4815 (Fig. 16), due to high hardenability, the values are the same for oil quenched bars in this section as for water quenched and, therefore, would be higher than C 1022 regardless of the fact that C 1022 was quenched in water.

It is quite probable that plain carbon steel, preferably C 1022, can be used in many places where an alloy steel is now used, and the difference in hardenability can be compensated for by water quenching where parts of not too large a section are reheated after carburizing. It cannot ordinarily be used for parts direct quenched from the carburizing heat, for water quenching would be too severe. In parts which are being successfully made from C 1022 the largest solid section is about 1 5/16 in. in diameter. The parts are in all cases carburized at 1700 deg. F. and cooled in the carburizing boxes.

There is no reason for any extension of carburizing cycles in changing over from alloy steel to plain carbon steel, nor is there any reason for concern over the carbon distribution characteristics of the case if the plain carbon steel is of the proper quality. Carburizing tests made on 1-in. rounds, box carburized at 1700 deg. F. for 8 hr. and slowly cooled, comparing AISI C 1022 with alloy steels, are shown in Fig. 17. In some instances the parts receive a preliminary quench in hot water (160 to 180 deg. F.) or oil from 1650 deg. F. for the purpose of eliminating carbide network in the case section and producing a more uniform core structure.

To illustrate the metallurgy evolved microscopically, Fig. 18 shows the microstructure of a carburized and slowly cooled case structure consisting of pearlite and carbide network. The microphotograph was taken to show the carbide network. The dark background consists of fine pearlite which is not resolved in this photograph.

Fig. 19 shows the case structure after quenching in hot water (170 deg. F.). This microstructure consists of martensite and troostite.

It is possible, when distortion is not an important factor, to quench directly from the carburizing heat or preferably by specially constructed furnaces to cool quickly enough to retard the precipitation of the carbide network and thus eliminate the preliminary reheat and quench in hot water or oil. This process of quickly cooling from the carburizing heat eliminates the possibility of machining operations on the parts after carburizing, as is common practice in a great many instances.

As previously stated, it is not common or good practice to use plain carbon steel parts in the direct

### Alloy Extra Differences Between Standard Steels and Recommended National Emergency Alternates

STANDARD AISI		RECOMMENDED N. E. ALTERNATES					
Grade	Extra (Dollars)	Grade	Extra (Dollars)	Grade	Extra (Dollars)	Grade	Extra (Dollars)
A-2317	1.70	NF-8020	.45	NF-8022	.45	NF-9420	.80
A-2320	1.70	NE-8020	.45	NE-8022	.45	NE-9420	.80
A-3115	.70	NF-8020	.45	NF-9420	.80		
A-3120	.70	NE-8020	.45	NE-9420	.80		
A-4023	.45	NF-8020	.45	NF-9422	.45	NE-9420	.80
A-4024	.55	NE-8020	.45	NE-8022	.45	NE-9420	.80
A-4119	.60	NF-8715	.80	NF-9420	.80		
A-4615	1.20	NF-8715	.80	NF-9420	.80		
A-4620	1.20	NF-8715	.80	NF-9420	.80		
A-5120	.35	NF-8715	.80	NF-9420	.80		
A-6120	.95	NE-8715	.80	NE-9420	.80		
A-4027	.45	NF-8022	.45	NF-9422	.80		
A-4032	.45	NF-8022	.45	NF-9422	.80		
A-4120	.60	NE-8022	.45	NE-9422	.80		
A-4220	1.45	NF-8720	.80	NF-9422	.80		
A-4815	2.15	NF-8715	.80	NF-9420	.80		
A-4820	2.15	NF-8720	.80	NF-9422	.80		
A-5212	2.55	NF-8715	.80	NF-9415	.80		
A-2515	2.55	NE-8720	.80	NE-9422	.80		
A-2330	1.70	NF-1330	.10	NF-9430	.80	NE-9630	.80
A-3130	.70	NE-1330	.10	NF-9430	.80	NE-9630	.80
A-4037	.45	NF-1330	.10	NF-9430	.80	NE-9630	.80
A-4042	.45	NE-1330	.10	NF-9430	.80	NE-9630	.80
A-4047	.45	NE-1335	.10	NE-9435	.80	NE-9635	.80
A-1130	.55	NF-1330	.10	NF-9430	.80	NE-9630	.80
A-5130	.45	NE-1330	.10	NF-9430	.80	NE-9630	.80
A-6130	1.20	NE-1330	.10	NF-9430	.80	NE-9630	.80
A-2335	1.70	NE-1340	.10	NF-9435	.80	NE-9635	.80
A-3135	.70	NE-1335	.10	NF-9435	.80	NE-9635	.80
A-5135	.45	NE-1335	.10	NF-9435	.80	NE-9635	.80
A-5140	.45	NE-1340	.10	NF-9435	.80	NE-9635	.80
A-6135	1.20	NE-1335	.10	NF-9435	.80	NE-9635	.80
A-6140	1.20	NE-1340	.10	NF-9435	.80	NE-9635	.80
A-4137	.55	NE-1340	.10	NE-9637	.80	NE-9437	.80
A-4640	1.20	NE-1340	.10	NE-9637	.80	NE-9437	.80
A-3045	.50	NE-1345	.10	NE-9640	.80	NE-9440	.80
A-3140	.70	NE-1345	.10	NE-9640	.80	NE-9440	.80
A-4140	.55	NE-1345	.10	NE-9640	.80	NE-9440	.80
A-4645	1.20	NE-1345	.10	NE-9640	.80	NE-9440	.80
A-5145	.35	NE-1345	.10	NE-9640	.80	NE-9440	.80
A-6145	1.20	NE-1345	.10	NE-9640	.80	NE-9440	.80
A-2340	1.70	NE-1345	.10	NE-9642	.85	NE-9442	.85
A-3141	.70	NE-1345	.10	NE-9642	.85	NE-9442	.85
A-3240	1.35	NE-1345	.10	NE-9642	.85	NE-9442	.85
A-4142	.55	NE-1345	.10	NE-9642	.85	NE-9442	.85
A-4337	1.85	NE-9537	1.20				
A-4340	1.70	NE-9540	1.20				
A-2345	1.70	NE-1350	.10	NE-9645	.85	NE-9445	.85
A-3145	.70	NE-1350	.10	NE-9645	.85	NE-9445	.85
A-4145	.55	NE-1350	.10	NE-9645	.85	NE-9445	.85
P-5150	.35	NE-1350	.10	NE-9645	.85	NE-9445	.85
A-6150	1.20	NE-1350	.10	NE-9645	.85	NE-9445	.85
A-2350	1.70	NE-9650	.85	NE-9450	.85		
A-3150	.70	NE-9650	.85	NE-9450	.85		
A-3250	1.35	NE-9650	.85	NE-9450	.85		
A-4150	.55	NE-9650	.85	NE-9450	.85		
A-4063	.45	NE-9255	.40				
A-4065	.45	NE-9280	.40				
A-4068	.45	NE-9282	.65				
E-52095	2.60	NE-52100C	2.60				
E-52098	2.60	NE-52100B	2.60				
E-52099	2.60	NE-52100A	2.60				
E-52100	2.60	NE-52100A	2.60				
E-52101	2.60	NE-52100A	2.60				
E-52107	2.60	NE-52100A	2.60				

Note: Extras are in dollars a 100-lb., basic open hearth. Electric steel is 50c. a 100-lb. additional. Relationship between Standard Steels and N.E. Steels comes from Table II A.I.S.I. pamphlet No. 8, Sept., 1942. See THE IRON AGE price page (April 15, page 142) for chemical limits of N.E. Steels.

quenched condition, at least for automotive work. The hardening heat recommended for C 1022 carburized parts will vary from 1450 to 1500 deg. F. Where the parts have been previously given a preliminary quench or cooled rapidly enough from the carburizing heat to prevent the precipitation of carbide network in the case of ferrite in the core, the final hardening heat at 1450 to 1500 deg. F. will produce a uniform martensitic case structure, as illustrated in Fig.

20, and if the solid section of the parts is of reasonable size, say 3/4 in. in diameter, the core structure will also be uniform as illustrated in Fig. 21.

Parts for which the service requirements are not too critical can be hardened after slowly cooling from the carburizing operation by a single quench in cold water from 1450 to 1500 deg. F. However, as this heat is not high enough to take into solution the carbide network of the case and the ferrite of the core, the micro-

structure will be comparable with that shown in Figs. 22 and 23.

It will be noted that the structure in Fig. 22 contains segregates of carbide and that in Fig. 23 contains segregations of ferrite.

In conclusion, it can be said that a plain carbon steel specified as AISI C 1022 special carburizing quality, ASTM E-19 grain size 5-8 (inclusive), silicon 0.15-0.30 per cent, can be satisfactorily substituted for an alloy steel, and that the heat treatment of

parts made from a plain carbon steel will require closer supervision.

*Editor's Note: Next week the author discusses replacement of alloy steels by plain carbon steels in the medium carbon grades for heat treated parts.*

## Correction of Brasses for Zinc Loss

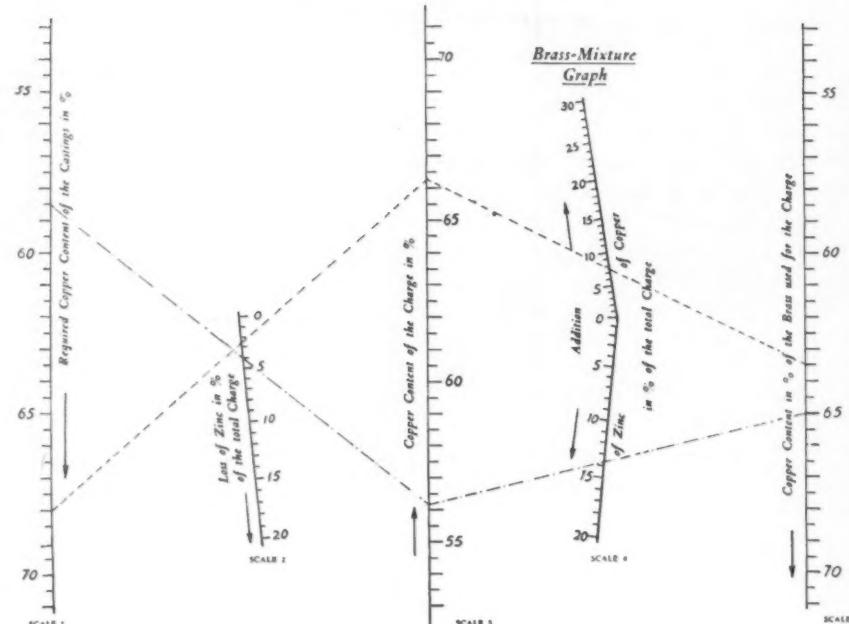
THE amount of copper or zinc to add to obtain brass of a particular composition can be found quickly through use of a chart showing correction of brasses for zinc loss, recently devised by Foundry Services, Inc. Two illustrations of how to use the chart are shown in the accompanying drawing.

In the first example, the following conditions are supposed: Brass with 68 per cent of copper is required. Zinc loss is found by experience to be 2.5 per cent of charge. Brass to be charged has a copper content of 63.5 per cent. What must be added to get the required alloy?

To work this out from the chart, join 68 on scale 1, which represents the copper content of the required alloy, to 2.5 on scale 2, representing the zinc loss. Continue this line to scale 3. Join the point where scale 3 is cut, to 63.5 on scale 5, representing the copper content of the brass charge. This line cuts scale 4 at 7.7, indicating that 7.7 lb. of copper per 100 lb. of charge must be added.

In the second example shown, it is supposed that castings with 58.5 per cent of copper are required. Zinc loss of 4 per cent is experienced. Brass

CORRECTION OF BRASSES FOR ZINC LOSS.



used for charging has a copper content of 65 per cent.

Join 58.5 on scale 1, to 4, for zinc loss, on scale 2. Continue this line to scale 3. Join the point on scale 3 where the line has cut, to 65 on scale

5. This last line intersects scale 4 at 13.7, indicating that 13.7 lb. of zinc per 100 lb. of charge must be added.

Copies of the chart may be obtained from Foundry Services, Inc., 280 Madison Avenue, New York.

## Determination of Inclusions

A MODIFICATION of Fitterer's method of determining inclusions in steel is described by A. G. Arend, in *British Steelmaker*, 1943, vol. 9, pp. 32-35. In this method, by electrolyzing selected samples of steel, the iron content can be made to migrate to the anode, while inclusions in the form of oxides, sulphides, slag, particles, etc., remain as an anode sludge. In the improved method almost the

entire sample is consumed. This is done by preparing the sample in round or elliptic "two-bar" form. The electrolyte consists of 3 per cent ferrous sulphate crystals and 1 per cent sodium chloride dissolved in distilled water. An artificial silk product is used for the dialyzing bags, and, instead of applying one ampere per 50-gr. sample, five times this current can be substituted depending upon the

a.c./d.c. ratio and the frequency of the former. The electrolysis is carried out in a copper tank which serves as the cathode for six samples. The samples become ionized with two positive charges, and the iron constituent passes rapidly into solution; in so doing the electrolyte passes through the walls of the bag, leaving behind the anode sludge which represents the inclusions contained in the sample.

# Cartridge Cases Continuously Annealed

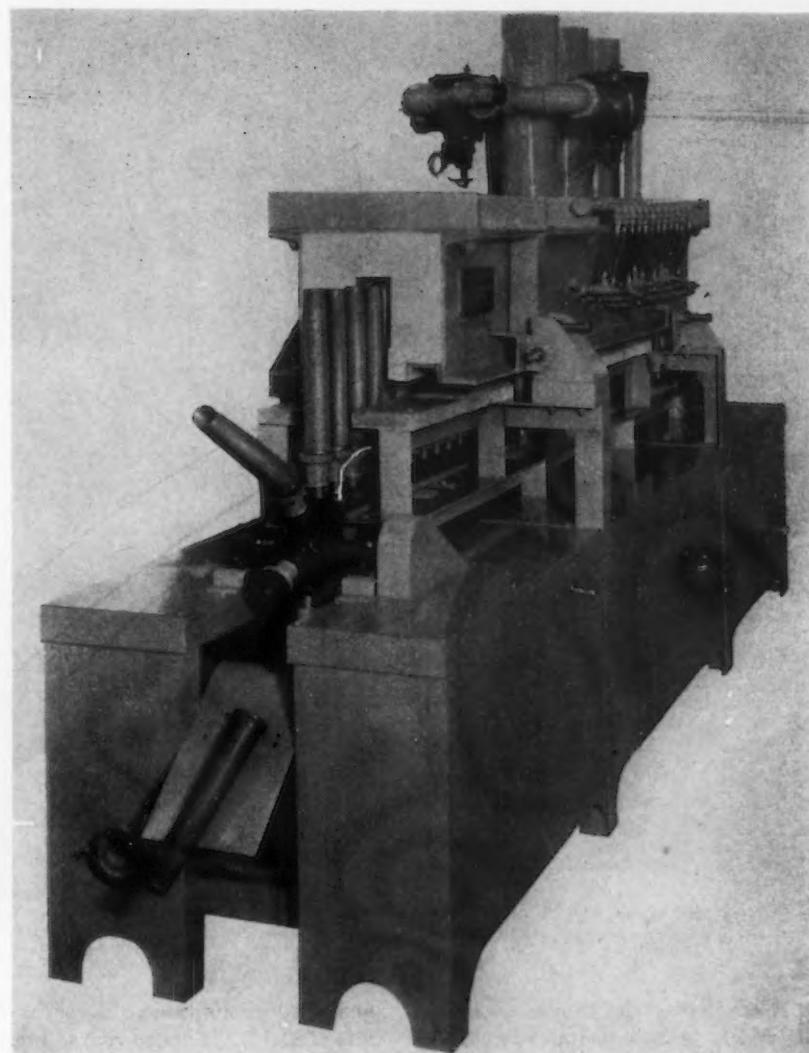
FOR the continuous annealing of the mouth ends of steel cartridge cases in sizes from 37 to 102 mm., the Selas Co., Philadelphia, has recently designed and built a series of automatic machines utilizing ceramic-cup radiant gas burners in refractory-lined tunnels which let down over moving lines of cartridge cases as shown in the illustration. Each cartridge case rotates (about 15 times) on an individual spindle during its transit through the annealing tunnel, so that uniform preheating, heating and cooling are achieved over the desired area. In the unit shown (for 37 and 40 mm. sizes) the tunnel is lowered sufficiently to anneal the metal down to a point several inches below the mouth opening.

Because combustion is confined within the ceramic concavity of each burner, flame does not directly impinge upon the cartridge cases, and discoloration is reported by users to be reduced to a minimum. Scaling is prevented because the work is surrounded by combustion products rather than air in all hot zones.

The 24 burners are staggered (12 in a zig-zag pattern on each side of the tunnel), and each burner has a built-in, needle-valve input adjustment. Thus, heat inputs at various points may be independently adjusted and balanced to suit the heat distribution pattern desired on the work. Consumption of fuel in the model shown amounts to 750 cu. ft. per hr. of natural gas, or 1400 cu. ft. per hr. of manufactured gas. The primer-cup end of each cartridge case remains cool at all times because of (1) the speed and localization of heating over the portion annealed, (2) the corrugated asbestos heat baffle immediately below the tunnel, and (3) the contact of the primer-cup end with the cold metal mass of the spindle upon which it rests.

In a 90-in. tunnel, 18 in. are devoted to preheating, 36 in. to full firing, and 36 in. to confined cooling. At a 3-in. center-to-center distance between adjacent rotating spindles 36 cartridge cases are in the tunnel at any instant. One cartridge case is annealed every 2 sec.

The annealing tunnel is quickly removable by lifting; is supported on jackscrews and positioned by longitudinal and transverse adjusting



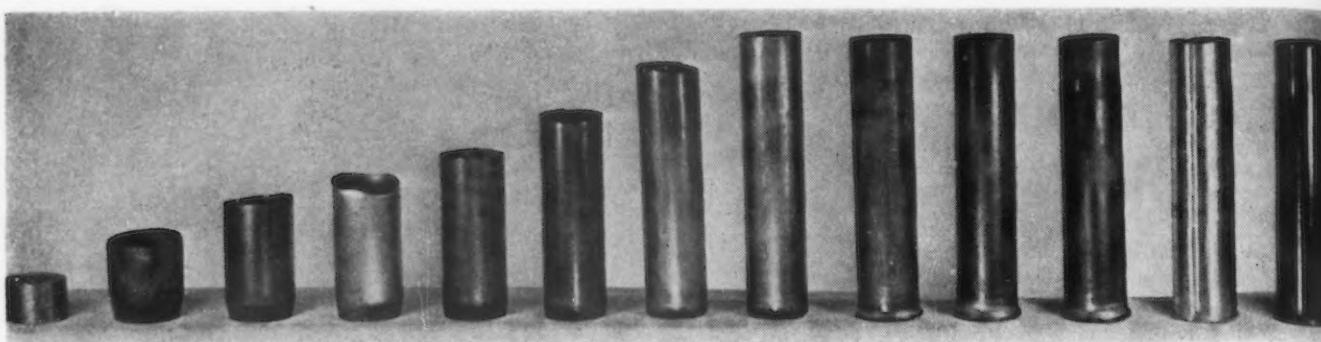
screws which allow for expansion; and is lined with 4½ in. of insulating refractory. The conveyor mechanism is adjustable for speed; hand loaded; driven by a ½ hp. motor; and utilizes self-aligning ball bearings and pillow blocks with take-up adjustment. Floor space of 2½ x 11 ft. is adequate, with loading at a level 36 in. above the floor.

Other similar machines have been designed for other localized annealing and hardening jobs on other ordnance parts in high-rate production—some utilizing semi-enclosed radiant burners (as in this instance), others utilizing special open arrangements of refractory-lined heat-concentrating burners of the so-called "superheat" variety.

## Electrolytic Polishing of Microspecimens

E. LÖWGREN and G. Hildebrand, in *Jernkontorets Annaler*, 1942, vol. 126, No. 4, pp. 131-142, describe a modification of the electrolytic polishing technique of A. L. De Sy and H. Haemers (see *Journal of Iron and Steel Institute (British)*, 1941, No. II, p. 29 A, which they developed to suit the laboratory requirements of Fagersta Bruks A/B. In the method described the specimen rests on the anode and is completely immersed in the electrolyte with the polished surface horizontal and facing the ca-

thode. The advantages claimed for this procedure are (1) No clamps are required to hold the specimen; (2) the "corner effect" is so slight as to be negligible so that the specimen can be examined for decarburization or other surface phenomena; (3) a constant current strength can be maintained regardless of the size of the specimen as long as it is smaller than the anode plate; and (4) increased polarization is obtained by having the anode under the cathode. Some micrographs of the polished surfaces are reproduced and discussed.



# Production of 75 mm. Steel Cartridge Cases

**I**N developing the 75 mm. shell case, which is now being successfully manufactured in large quantities, it was found that the required physical properties of the case could be obtained either by cold work alone or by quenching and tempering before or after cold working. Cold working alone involves the least number of operations, fewer shop problems, less equipment, and has been found adequate. Quenching after cold working results in distortion of the case which must be controlled by intricate quenching dies or by additional sizing operations. Quenching followed by cold working eliminates the distortion problem and has been employed successfully on experimental lots. Where cold working alone, or quenching before cold working is employed, a final stress relieving treatment should be used to improve further the physical properties.

In the selection of a material, a low carbon steel was chosen which could be cold worked and stress relieved to the required physical properties without resorting to a spheroidizing treatment prior to cold forming. Among the compositions tried during the development were SAE 1015, 1016 and 1020, AISI C-1019, and a higher manganese type containing 0.20 carbon

and 1.29 manganese. Experimental lots of C-1019 included coarse grained, fine grained, alumirum killed and silicon killed steels. The composition finally adopted, and now in production, is an open hearth, high manganese, aluminum killed fine grain carbon steel. Best mill practice with regard to discard, surface conditioning and

cold redraw; 15, third cold redraw; 16, trim end; 17 fourth cold redraw; 18, bonderize; 19, cold head; 20, flame anneal; 21, first taper; 22, second taper; 23, flame anneal; 24, machine base; 25, face to length; 26, finish ream and counterbore; 27, inspect and repair; 28, draw; 29, phosphoric acid pickle; 30, paint; 31, bake.

• • •

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• • •

macrostructure is essential in producing suitable steel for cartridge cases.

The following is a list of the major operations performed in the manufacture of the 75 mm. steel cartridge case at Buick:

1, cut off; 2, grind o.d.; 3, heat; 4, extrude; 5, redraw hot; 6, size cold; 7, anneal; 8, pickle and rinse; 9, coin head; 10, bonderize; 11, draw; 12, trim end; 13, first cold redraw; 14, second

cold redraw; 15, third cold redraw; 16, trim end; 17 fourth cold redraw; 18, bonderize; 19, cold head; 20, flame anneal; 21, first taper; 22, second taper; 23, flame anneal; 24, machine base; 25, face to length; 26, finish ream and counterbore; 27, inspect and repair; 28, draw; 29, phosphoric acid pickle; 30, paint; 31, bake.

It has been standard practice to start with the 3-in. blank to form the 75 mm. case, but experiments indicated that by starting with a somewhat larger blank, it was possible to get a better filling of the dies in the hot operations. Hence, the blank was increased from 3 to 3½ in. diameter, although this meant no essential change in the method.

The centerless grinding serves to provide a more perfect surface, eliminating defects which would tend to carry through the subsequent operations.

Heating for the hot cupping operation is done in a specially built induction heater, the piece being brought to temperature in 1½ min. (Fig. 1.) The machine has two fixtures which may be operated simultaneously, permitting a production rate of 80 pieces per hr. During the brief period of heating, a yellow gas flame is directed onto the steel, en-

veloping it and preventing scaling. The current kicks off when the piece has been brought to temperature, and it is then transferred to a gas fired muffle furnace where it is held for 7 min. to insure an even temperature throughout the steel. This setup is only temporary. Two new induction heating units are on order which will eliminate the soaking furnace.

The extrusion is done in a standard forging press of the crank type common to many automotive shops. The upper die member is a hot die steel punch, nitrided for improved wearing qualities and rounded at the end to form a smooth radius at the base of the cup. The lower die has a cavity the size of the formed cup, or virtually the same diameter as the heated blank. The punch extrudes the blank from  $1\frac{3}{4}$  in. to about 4 in. A standard forging grease or graphite paste is used to lubricate the dies and there is no trouble with sticking of the formed piece because a stripper on the punch removes the part on the upstroke of the punch.

In the early stages of the work only one hot cupping operation was used, but it was later determined that better results could be obtained if a second hot operation were carried out after the piece had cooled somewhat. The second hot press is the same as the first, except for slightly altered tooling extending the draw 2 in. further, or to about 6 in.

After the original setup was worked out, an extra operation was added to control the wall thickness. The cup is cold sized in a press, drawing it out only slightly. This is done after the hot redrawn cup has cooled in air.

After annealing, followed by acid pickling and washing to remove scale, the head of the cup is coined in a crank press. This operation sizes it accurately as well as giving this portion of the case some extra cold work, because in the subsequent cold drawing operations the head does not receive as much work as the walls. Bonderite treatments serve both to clean the surface of the case thoroughly and to etch it slightly so that minute pockets will retain drawing compound in the cold operations. Further, the thin surface layer of zinc phosphate deposited in this chemical treatment acts as a lubricant during cold drawing.

Hydrogen embrittlement resulting from the acid pickling and bonderite operations tends to cause breakage during cold drawing. This trouble is eliminated by annealing which drives off absorbed hydrogen.

Perhaps the most interesting step



FIG. 1—Induction heating for hot extrusion and redraw. Eighty pieces per hr. may be handled on the machine with two fixtures operating simultaneously.

○ ○ ○

FIG. 2—Four cold drawing operations are carried out on this single 750-ton double acting press. The case progresses from the left hand die to the right hand die on one side of the press, then to the left and the right on the other side, with a total draw of 9 in. and no substantial change in diameter.





**FIG. 3**—The cold heading press is equipped with a two-stage indexing die. After the first stroke, the lower die can be moved across the press, bringing the second die impression under the punch carrying the case.

in the entire operation is the series of four cold drawing operations, all carried out on a single 750-ton Clearing double acting press. (Fig. 2.) The four punch and die stations are placed to form the four corners of a rectangle well within the normal platen area, and are so arranged as to carry approximately an equal load, of somewhere near 150 tons per station. The depth of draw varies slightly over the four dies, being controlled by the length of the punch. The cartridge case progresses from the left hand die to the right hand die on one side of the press and is then handed through the die opening and placed on the die directly across from the second station, finally moving to the right hand die on that side. Four operators handle the press, one at each die. Each punch has an integral mechanical stripper which removes the part after drawing.

On this press, the 6 in. cup is drawn to 15 in. and to the approximate form of the finished case, a total draw of 9 in. with no substantial change in diameter. This is a real test of the drawing qualities of the steel, and it is noteworthy that few pieces are torn or split in these severe operations. A special drawing compound was de-

veloped, the base material of which is machine oil.

The case is cold headed in a press equipped with a two-stage indexing

die, the lower die being built so that after the first stroke it can be moved across the press, bringing the second die impression under the punch carrying the case. (Fig. 3.) In these operations the steel in the base is flared out so that the flange can be machined, the steel to fill this expanded rim being furnished by the extra thickness formed around the outer edge in the original hot cup.

Annealing before tapering is quite critical. (Fig. 4.) It is limited at the mouth end to a depth of about 2 in. to prevent splits during tapering. The temperature is closely controlled. In this operation, the cases are mounted on a conveyor and moved between two rows of 2½ in. radiant gas burners. These are mounted in a furnace horizontally at the proper height to concentrate the heat on the mouths of the cases as they travel through the furnace. The cases are rotated slowly as they move past the burners.

Tapering operations are perhaps the most critical of all steps since, in these two press operations, the cold steel must be made to flow into the desired taper without wrinkling or distortion and without the support of a punch on the inside. The case is simply forced up into a tapered die cavity in two stages both on the same press. The second stage does have a punch which extends about 3½ in. into the case. This is required not for the overall taper but to support the metal in forming the reduced section at the mouth.

Punches used on all the cold draw-

**FIG. 4**—Annealing before tapering is limited at the mouth end to a depth of about 2 in. to prevent splits during tapering. The cases move on a conveyor between two rows of 2½ in. radiant gas burners, mounted horizontally at the proper height.



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ing and tapering operations are made of hardened high speed steel, chromium plated. The plating improves the wearing qualities and provides better anti-frictional properties. Lower dies in the cold operations are generally steel rings with tungsten carbide inserts on the working surfaces.

After the tapering operations, the mouth end becomes appreciably harder because of the cold working, so it is annealed once more, this time to a depth of about  $3\frac{1}{2}$  in. from the open end. This softens up the mouth and assures a tight seal in the gun barrel.

The cases are inspected and transferred to automatic lathes which face the head, rough form the flange, finish form the flange and drill the primer hole. (Fig. 5.) These lathes have five stations, four for the machining operations and one for loading and unloading. Reaming and counterboring the primer hole are performed on vertical machines to unusually close tolerances.

Final stress relieving is performed in a batch type electric furnace accommodating 316 cases. This heat treatment adds roughly 10,000 lb. per sq. in. to the yield and ultimate strength of the case.

The coating specified to provide protection against corrosion and sparking is an unpigmented baked phenolic varnish. Before painting, the cases are given a phosphoric acid pickle which provides a bond for the paint and also some additional protection against corrosion.

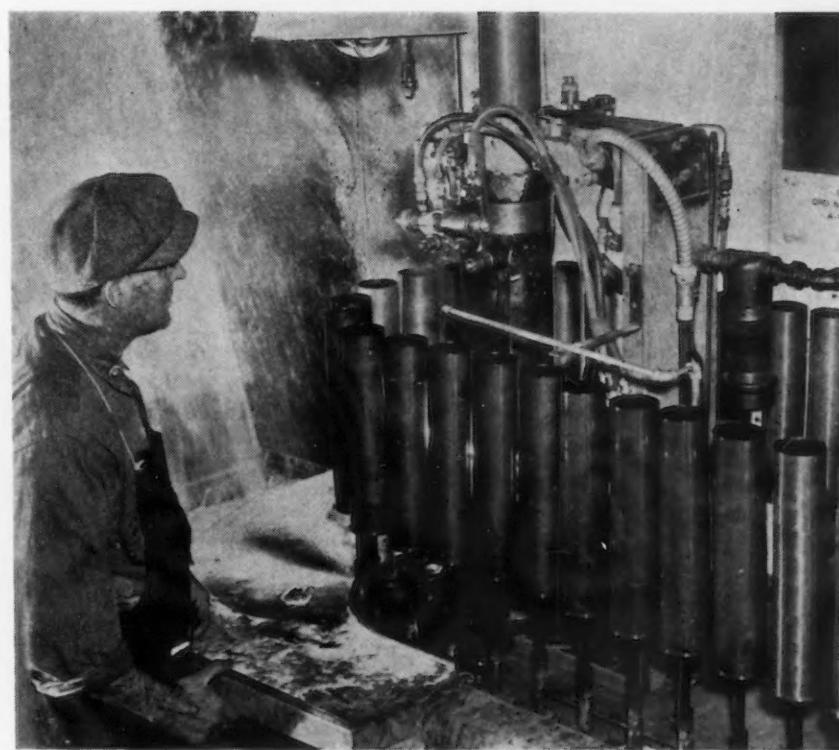


FIG. 6—Painting and baking operations are fully automatic. As the cases pass the spray nozzles they are spun by a motor driven rubber belt. One nozzle is mounted on a traveling arm which descends into the case and lifts out at a uniform speed, while outside nozzles simultaneously coat the base and wall.

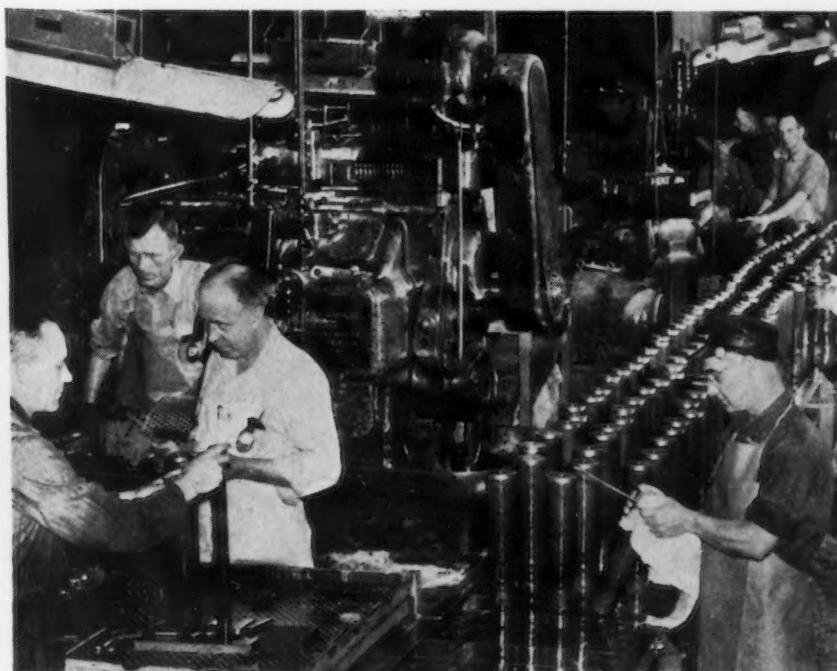
The painting and baking operations are fully automatic, the cases being mounted vertically on a conveyor with the open end up. (Fig. 6.) They rest on fixtures attached to the conveyor chain so that as they pass the spray nozzles they can be spun by a motor-driven rubber belt. One spray nozzle

is mounted on a traveling arm which descends into the case and lifts out at a uniform speed while the nozzle directs a spray of varnish over the rotating surface. At the same time, outside nozzles are positioned to coat the base and wall.

Once coated, the cases are carried slowly between two banks of infrared lamps, 64 on each side. The conveyor loops twice at the end of the lamp bank so that the cases travel three times through the baking zone, requiring 48 min. in a temperature of about 360 deg. F. When they emerge at the opposite end from the painting station they pass through an exhaust cooling hood to an unloading station.

One unusual type of inspection tool has been developed to permit close observation of the interior wall of the case. A cone-shaped piece of steel slightly smaller in diameter than the case is chromium plated to a mirror finish on the outer surface of the cone. A wire is attached to the apex of the cone and a small light arranged to illuminate the interior of the case and the bright surface of the cone. The unit is lowered to the base of a case and drawn slowly upward while the inspector watches the mirror surface. The inner surface of the case is reflected in magnified form so that any surface defects are readily observed.

FIG. 5—Machining line where the heads are faced, flanges formed and primer holes drilled, reamed and counterbored.



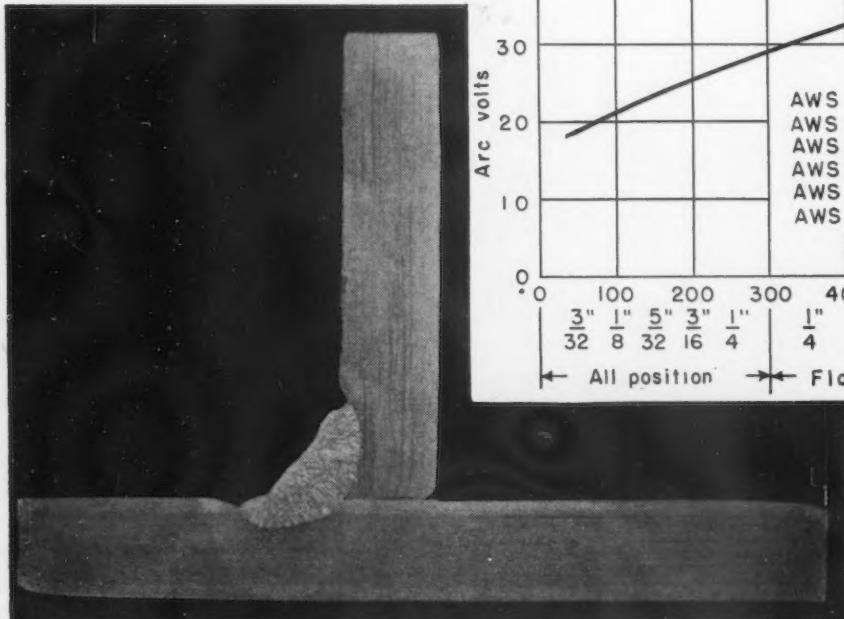
# Arc Welding Electrodes—

HERE are four fundamentals of welding technique which affect the deposition of weld metal. These are:

1. Current setting
2. Length of arc
3. Angle of electrode
4. Speed of travel

Electrode coatings are designed to withstand the maximum current possible and to maintain proper shielding of the arc and arcing characteristics so that the maximum deposition rate may be obtained. There is an optimum current setting for each electrode, depending upon its size and type of coating. It is, of course, important that the current used does not overheat the coating throughout its entire usable length. This must be true even though the arc is not broken (or is broken with rapid restarts) while the electrode is being consumed from the striking to the holder end. The optimum current varies with different types and makes of electrodes, but generally speaking, the mineral type of coating can withstand higher amperages than the cellulose type.

**BELOW**  
FIG. 4—Horizontal fillet weld showing undercut resulting from too long an arc when using Class E6020 electrode.



Since the selection of the arc welding current to be used will also depend upon other conditions such as plate thickness, fitup of joint and position of welding, it is not practical to attempt to give specific data on this. However, we can describe the effect of too high or too low a welding current on certain qualities of the deposit as follows:

#### Effect of Current Setting

Too high a welding current will introduce excessive porosity into the deposit. It will cause excessive spatter loss and in some cases objectionable undercutting. High currents will generally tend to increase convexity especially in the vertical position.

Low welding current may cause slag inclusions, convex fillet welds and inadequate penetration. Either too low or too high a current may impair physical qualities of deposited weld metal due to slag and/or porosity inclusions.

Fig. 3 indicates the range of arc welding current and arc voltages for various diameters of electrodes ranging from  $1/16$  to  $3/8$  in. in diameter

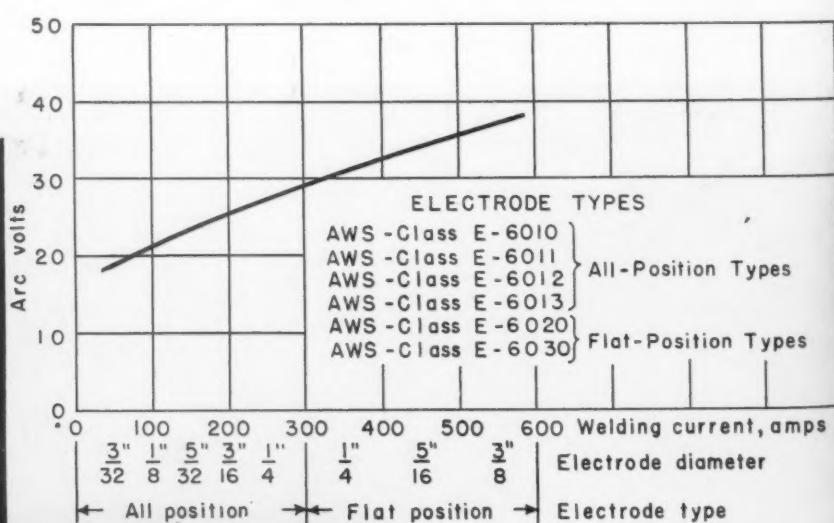
inclusive. This should be used as a guide only and is subject to considerable variation under certain special conditions. These values should be approximately correct for average conditions.

#### Length of Arc

The length of arc, or arc voltage, for optimum results will vary with different types and makes of electrodes. Average values are shown in Fig. 3. The effect of too long or too short an arc on deposited weld metal is summarized as follows:

Too long an arc will result in improper shielding and may snap out. Long arcs tend to decrease convexity and increase concavity of deposited fillet welds; also, increase undercutting, Figs. 4 and 5. Short arc reduces heat, causing danger of slag entrapment and tends to develop convex fillet welds, Fig. 6. Either too long or too short an arc will tend to impair physical qualities of deposited weld metal due to improper shielding or slag inclusion.

Excessive convexity, it should be noted, wastes scarce electrode mate-



#### ABOVE

FIG. 3—Average arc voltage at various welding currents. If the voltage is measured at the machine terminals, the cable drop in voltage should be subtracted to obtain the voltage at the arc.

# How to Use Them

By H. O. WESTENDARP, JR.  
Welding Engineer, General Electric Co.,  
Schenectady.

rial and results in stress concentration at the toe of fillet welds. Excessive concavity of fillet weld will reduce throat dimensions and consequently the strength of the fillet.

## Angle of Electrode

When making a horizontal fillet weld it is important that the electrode be held at the proper angle in reference to horizontal and vertical plates and also to the line of travel, if proper deposition of metal is to be obtained. Two general techniques are recommended as follows:

**Normal Heat.** In this case, good welding practice indicates that the electrode should be approximately 45 deg. from vertical and horizontal plates, in other words, bisecting the angle formed by the adjoining plates. With reference to the line of travel, good practice ranges from 0 to 30 deg. off the vertical, leaning in the direction of travel.

**High Heat.** In this case, some welding engineers prefer to depart from the angle indicated above under "normal heat" and advocate holding the electrode approximately 30 deg. off the vertical plate and 60 deg. from the horizontal plate. The coating generally touches the horizontal plate lightly and is held about  $\frac{1}{8}$  in. away

. . . In the first part of this article, the author described how mild steel arc welding electrodes are made and the purpose of the various types of coatings. In this concluding part, Mr. Westendarp discusses the practical aspects of arc welding from the point of view of getting the most out of electrodes.

from the vertical plate. The angle of the electrode in reference to the line of travel is generally from 0 to 30 deg. off the vertical, leaning in direction of travel.

Certain heavily coated electrodes of the class E-6020 type can be successfully applied at high current and travel speed by holding the electrode at an angle of 45 deg. from both the horizontal and the vertical plates and 90 deg. in reference to the line of travel, in which case it is recommended that the coating of the electrode touch both horizontal and ver-

tical plate lightly. It is important that precise control of welding current and travel speed be maintained. Progressive engineers have been advocating this technique with class E6020 electrode as it develops greater penetration, thus increasing the strength of the weld. Excellent results are being obtained in certain welderies where close supervision is maintained.

Unless the proper angle of the electrode is maintained between vertical and horizontal plates in making fillet welds, it will be difficult to produce



ABOVE

FIG. 6—Horizontal fillet weld using Class E6010. In this weld too short an arc has resulted in inadequate penetration and slag inclusions.

o o o

LEFT

FIG. 5—Horizontal fillet weld showing weld resulting from correct technique when using Class E6020 electrode.

symmetrical fillets and fillets having unequal legs may result. This wastes scarce electrode material.

Maximum penetration effect is obtained when holding the electrode at 90 deg. to the line of travel, but this introduces a slight danger of excessive undercutting, especially with class E6010 electrode. By holding the electrode from 0 to 30 deg. off the vertical, leaning in the direction of the line of travel, adequate penetration is obtained and the deposited weld metal is washed back to fill the plate material cut away by the arc action. Objectionable undercutting is thus avoided. If the electrode is leaned forward too far (more than 40 deg. off the vertical), penetration is reduced and may be inadequate.

#### Speed of Travel

Assuming that arc welding current and voltage are correct and that the electrode is held at the proper angle, there is definitely an optimum rate of travel speed. This should be just fast enough to keep the slag from either running ahead of or crowding the electrode. If the travel speed is too slow, metal is piled up and wasted. If the travel speed is too

*See also "How to Figure Arc Welding Speed" by H. O. Westendarp, Jr., THE IRON AGE Sept. 24, 1942. (Reprint available from author).*

fast, the proper size weld will not be produced and objectionable undercutting may result. There is also a possibility of pockets and surface porosity resulting from inadequate slag coverage.

Since travel speed is subject to many variables such as plate thickness, size of electrode, and welding current used, etc., it is impractical to attempt to give specific data. It is important to note, however, that tremendous possibilities exist for in-

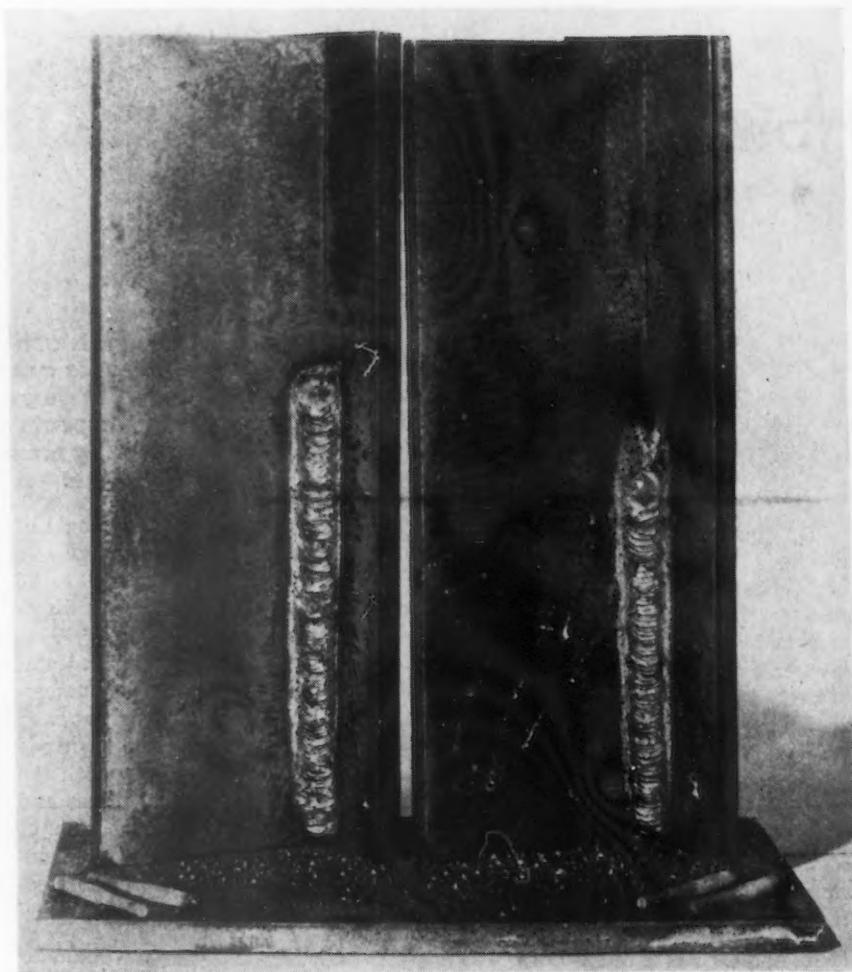


FIG. 7—Vertical fillet welds made with short whip (left) and long whip (right), showing conservation made possible by use of short whip. AWS Class E6010 rod was used.

crease of travel speed. There are innumerable applications where the welding operator can actually move the electrode along the line of weld at a much higher speed, without sacrificing accurate arc control, than the actual welding speed now being employed.

In many cases, a larger electrode can be used at increased amperage

and still be entirely satisfactory from an application standpoint. The use of larger electrodes would permit the operator to increase speed within the limits of his ability to maintain a uniform arc length and travel speed. In other words, this boils down to the selection of the largest possible electrode and highest welding current for the job in order to permit the operator to traverse the electrode at the highest rate of speed within the limits of the skill he has developed.

In addition to the above fundamentals, other factors pertaining to welding technique should be clarified:

**Weaving.** Weaving is defined as an oscillation of the electrode at right angles to the direction of travel and has an important effect on the resulting deposited metal weld. Weaving is employed when it is necessary to weld joints which are wider than can be filled successfully and completely by straight-line travel. It is important that good side-wall fusion be obtained in making butt welds and that the deposited metal be washed into the side of adjoining plates in making fillet welds. In order that this be ac-

TABLE II  
Common Causes of Weld Cracks

CAUSE	RESULTING FROM	CURE
Small throat dimension	Improper current, long arc or fast travel	Correct current, correct arc length or correct travel
Craters	Faulty technique	Back step and fill craters
High quenching rate	Heavy plate or plate at low temperature	Preheat *
Contamination of deposit	Pick-up from base metal	Remove slag, etc. Use proper type electrode and welding technique

\*Usually required on plate stock of 0.40 per cent carbon and higher.

Weld cracks may also be due to lack of ductility in deposit caused by high sulphur or phosphorus content in electrode or plate stock.

complished, weaving is sometimes necessary. Good welding practice limits weaving to a maximum of four nominal diameters of the electrode. Beyond this, there is a tendency to introduce excessive porosity and it is difficult to control side-wall fusion uniformly. Generally speaking, weaving tends to introduce porosity. However, up to four nominal rod diameters, it tends to improve the quality of the deposited weld metal. Weaving increases ductility of deposit and tends to slightly lower the yield point and ultimate tensile strength as compared to physical properties obtained from straight-line welding.

**Whipping.** Whipping is defined as an oscillation of the electrode in the direction of the line of travel. It is employed in certain applications where it is desired to preheat the work or burn off the coating of metallic coated stock like galvanized plate. Whipping is also used in vertical welding where a continuous application of heat would result in the deposit overflowing the face of the weld due to gravity. The procedure here is to whip the electrode upward and slightly away from the pool momentarily and then return it to welding position.

It should be pointed out that particularly in vertical work, there seems to be an opportunity for improvement in welding technique in some places. There is a tendency to use arc welding currents which are high when welding in vertical posi-

A.W.S. Class No.	TABLE III		
	E6020	E6010	E6010 F F V & O
Position	F	F	V & O
Deposition eff., %	70	80	70
Total losses	30	20	30
Flux/steel loss, %	25	11	11
Spatter loss	5	9	19

tion and then whipping the electrode quite excessively in the direction of welding in order to permit cooling of the pool and prevent slag running down over the face of the weld.

If carried too far, this technique will result in high melting rate of the electrode, but will lower deposition efficiency and will reduce actual welding speed. It would be better to set the welding current at a somewhat lower value and keep whipping to a minimum. In other words, use as high a welding current as is possible without the necessity of a long "whip," Fig. 7. As far as can be determined, whipping does not impair physical properties, but it does increase spatter loss, particularly in vertical welding and is, therefore, to be avoided or kept at a minimum.

**Penetration.** Penetration is defined as the depth of fusion of weld metal into the base metal. It should not be confused with fusion which is defined as a mixture of the base metal with the deposited weld metal. Penetration is subject to such conditions as type of electrode, welding current and arc voltage. It is also affected by angle

of electrode and speed of travel. Penetration increases with welding current and is usually greatest with a short arc when using class E6020 and E6030 electrodes, and with medium arcs with E6010 and other "all-position" type electrodes. (See Table I in first part of article.) An extremely short arc used with "all-position" type electrodes may result in decreased penetration.

### Troubles

To correct trouble, it is necessary to understand what causes it. A few of the more common difficulties, together with the usual causes and corrective measures are, therefore, listed below:

**Undercutting.** This is usually caused either by excessive welding current, long arc, 90 deg. angle of electrode with reference to line of travel or too fast a travel speed. The corrections are obvious, and taking them in order, they are: Reduce current, reduce arc voltage (length of arc), lean electrode forward in direction of travel or decrease travel speed. The last two measures are usually tied together. In other words, when reducing travel speed it is usually advisable to lean the electrode slightly forward in direction of line of travel.

**Convexity.** This is usually caused by too short an arc or by too slow a travel speed and the corrective measures are obvious. Lengthen the arc or increase the travel speed, or use a combination of both.

**Slag Inclusions.** Slag inclusions are usually caused by low current and extremely short arc. Correction is to increase current and/or strengthen the arc.

**Porosity Inclusions.** This difficulty is usually due to high heat or a long arc and should be corrected by reducing the welding current or by shortening the arc down to normal value.

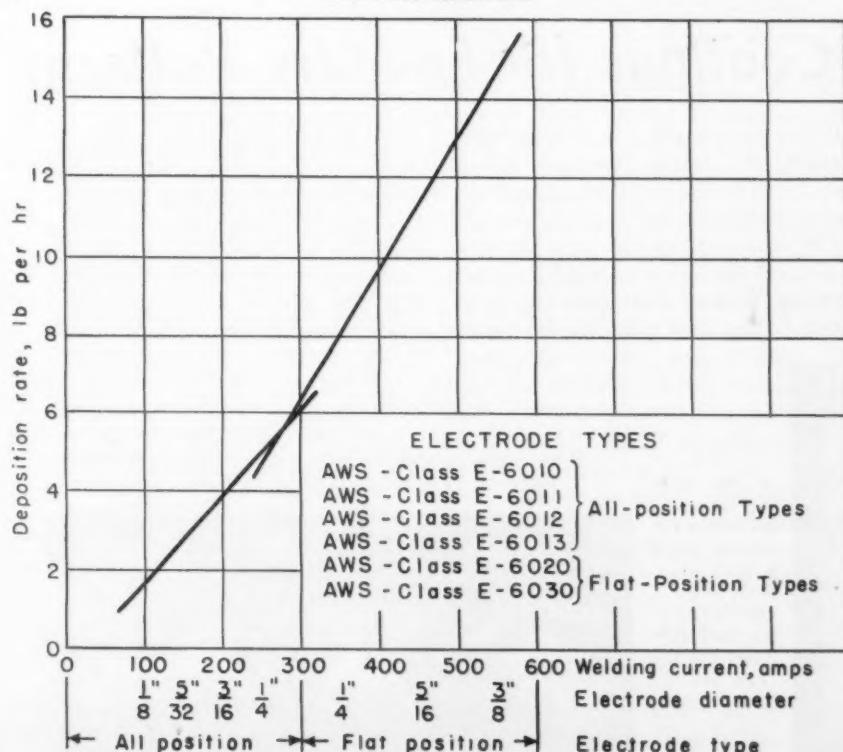
**Weld Cracks.** The causes of weld cracks are numerous. See Table II for the more common causes and the corrective measures recommended.

Since questions have arisen concerning the deposition efficiency and the deposition rate of various classes of electrode, it is probably in order to clarify these two factors.

### Deposition Efficiency

Deposition efficiency is the ratio of the pounds of electrode metal deposited in the joint divided by the pounds of electrode melted. Since the stub ends are not consumed, it is obvious they are not included in the

FIG. 8—Typical deposition rates corresponding to recommended welding current for various size electrodes.



pounds of electrode melted. Deposition efficiencies directly affect the conservation of scarce electrode material and it is important therefore that highest efficiency possible be realized.

Deposition efficiencies are usually higher for "all-position" types of electrode having relatively thinner coatings than they are for "flat-position" types having relatively heavy coatings. This is due to the fact that the flat-position types have a higher ratio of flux-to-steel. It does not necessarily mean that there is a greater amount of spatter obtained when welding with the relatively lower deposition efficiency electrode of the flat-position type. As a matter of fact, there is less spatter from the flat-position types of electrodes because of the better arc concentration from the heavier coatings even though the deposition efficiency of the flat-position type is less. See Table III for typical deposition efficiencies.

It is interesting to note that the deposition efficiency is subject to control by the electrode manufacturer as well as the user. In other words, the electrode laboratories and manufacturing plants control the flux-to-steel ratio by designing and manufacturing in such a way as to keep this to a minimum consistent with required physical properties and usability characteristics. On the other hand, spatter loss is largely up to the welding operator and dependent on the welding technique used.

Deposition rate is defined as the weight of electrode actually deposited in the joint per unit of time and is usually expressed in pounds per hour. The deposition rate of an electrode is the product of its melting rate times its deposition efficiency. Both of these are functions of the electrode size, welding current and technique used. The deposition rate of an electrode directly affects the quantity of goods produced in a given amount of time. It is important therefore that the highest deposition rate possible be realized in production. To accomplish this it is necessary to use the largest size electrode that can be successfully applied. Typical deposition rates are shown in Fig. 8.

#### Selection of Electrode Size

*V and O Positions.* Since vertical and overhead welding limits the electrode size to a 3/16-in. diameter maximum (it is not practical to weld in V and O positions with larger diameters because the size of the pool and the effect of gravity are too great) there is not much option in the selection of diameter for V and O work. Up to 3/16-in. diameter, the size of the electrode used is limited by thickness of the plate. Generally speaking, for vertical and overhead work, good welding practice indicates the use of an electrode diameter equal to or one size larger than the plate thickness. This is also affected by the size of the

fillet welds to be produced. Electrode size should not be greater than the fillet size; otherwise fillets having excessive convexity are developed, wasting scarce electrode material.

*Flat Position.* There is considerable leeway in the selection of electrode diameter for flat-position work. Electrode diameter is usually equal to or one size larger than the plate thickness. Some operators have used 1/4-in. electrode to weld 16-gage stock at very high travel speed. However, a high degree of skill is required to maintain uniform travel at high speed. The size of electrode and corresponding deposition rate obtained for work done in the flat position will depend very largely on the requirements of the job from the standpoint of quality, appearance, etc., as well as the skill of the operator and the plate thickness.

Typical deposition rates are shown in Fig. 4. It should be noted that deposition rates for 3/16 in. and smaller size electrodes represent values corresponding to an average of flat, vertical and overhead position welding. The deposition rates on 1/4-in. size and larger are all based on welding in the horizontal or flat position.

It is hoped that this discussion will be of some benefit to the thousands of men and women who have been recently drawn into this vital industry in behalf of the war production program.

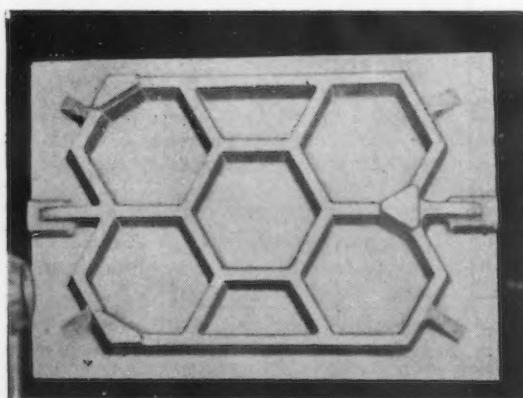
## Protective Metal Coatings for Foundry Patterns

**W**EAPROOFING wooden core boxes and foundry patterns against the abrasive action of sand by spraying the surfaces with a light coating of metal has been found to prolong the life of the patterns, and to eliminate the necessity of frequent and costly rebuilding.

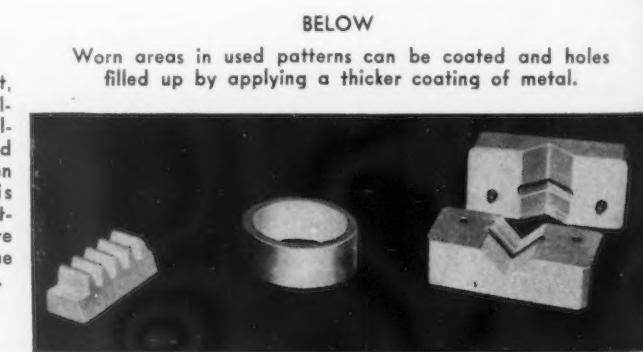
If the wood surface is soft, or open grained, the metal can be sprayed directly onto the finished wood surface without special preparation. If the wood is hard and close-grained, a coating of shellac is applied and the spraying is done when the shellac is "tacky." In either case, the thickness

of the coating is usually 0.002 to about 0.005 in. After the coating is sprayed, it is cooled and sanded.

The equipment used is an Alloy-Sprayer, an electrically heated and thermostatically controlled metal melting pot, with a gun handle for air pressure control.



**LEFT**  
A low cost, low fusing alloy with a relatively hard surface when finished is used for coating used core boxes, like the one above.



**BELLOW**  
Worn areas in used patterns can be coated and holes filled up by applying a thicker coating of metal.

# Foundrymen Review First Year of War

FOUNDRYMEN are hardy souls. And it is fortunate that they are, for less hardy men surely could not have weathered the storms that have swirled about the heads of American foundrymen during the first year of the war.

It was with the purpose of reviewing the accomplishments and failures of this past year, to confer on new techniques to speed war casting production and to seek direct answers to perplexing plant problems that foundrymen, some 1800 as a matter of record, went to St. Louis last week to attend the second war production congress of the American Foundrymen's Association.

By and large, a summing up of

the debits and credits of the past year shows the nation's foundrymen to be largely in the black. Their production accomplishments and technological achievements have been truly amazing. They have met and have exceeded the promises they made to the nation a year ago.

Nor has the future been forgotten, either, to judge by hints of things to come, dropped around the meeting halls.

This year's meeting was precedent breaking in many respects. Attendance of about 1800 was said to be one of the largest for any meeting held without the convention exhibit. For the first time, the technical sessions included a woman speaker. Too, this year marked the presentation of the first AFA Foundation lecture.

If there should exist any doubt of the value of the meeting, one need only sit in on a single session to discover the serious purpose of the foundrymen who came to St. Louis. One metallurgist from an aircraft plant came to the meeting armed with a note book containing 25 specific problems affecting his company's foundry. Unable to find the answers elsewhere, he hoped to find them somewhere among the attending foundrymen. When last seen, a few hours before the closing of the meeting, he had 19 questions neatly crossed off.

So intense were the meetings that it became almost an impossibility to keep the discussions on the announced subject. A meeting on radiological inspection, for example, took on the appearance of a sand shop course; a discussion of sand turned into a debate on melting pots.

The industry's pledge to an all-out effort to produce war castings, taken

at the 1943 meeting, was again restated, although it appears now that, except for light alloys and steel, the industry's effort will be forced more into technological developments rather than into actual tonnage problems as was the case a year ago.

Typical of the things that give foundrymen gray hair was the report by Col. Merle H. Davis, St. Louis ordnance district chief, at the opening sessions of the meeting, that over 90 per cent of ordnance prime contractors, including foundries, are now, of necessity, operating below capacity due to curtailment of contracts. Col. Davis indicated that this cutback might be expected to continue. The only type of contracts not yet affected were said to be aircraft and ships.

These cutbacks were ascribed to the outstanding production job accomplished by American industry. "Army Ordnance overshot its mark," Col. Davis freely admitted. "It did not reckon with the versatility of a metals industry just out of an industrial depression."

With the problem of ordnance volume solved, new problems have appeared, Col. Davis said, two of these new headaches being material shortages and overseas packaging.

"The whole business of substitution is a gay kaleidoscope of shifting from one substitute to another," he said.

The speaker took down his hair and reviewed the castings situation in a manner seldom done by a public



LT. COL. J. M. COLBY  
Speaker at the annual AFA dinner



R. J. TEETOR

figure in the history of the association.

It was the lack of inspection techniques which, in the past, retarded the general use of castings for ordnance, he declared. Now castings, together with stampings, are being used as widely as possible. It is interesting to note how well this statement by Col. Davis bears out some of the remarks made by the Foundation lecturer, J. W. Bolton.

Directing his remarks to the steel casting industry specifically, the ordnance district chief said that the steel casting men have been particularly aggressive in selling their product. Ordnance items have multiplied the steel castings capacity of the nation by about five times in the past two years, with half of the fighting tanks now consisting of cast steel.

He suggested to foundrymen that they pay strict attention to deoxidation practice and to impact resistance at low temperatures.

"We do not know how soon our operations will move north," he said. When they do, ordnance must have castings with high impact resistance at low temperatures. He cited as a possible specification a minimum of 10 ft. lb. resistance at -50 deg. F.

Turning to malleable castings, Col. Davis remarked that they did not have a large war application. Malleable can be used successfully for parts formerly produced by machining bar stock, or for substituting for non-ferrous casting.

The good shock resistance of malleable leads Ordnance to believe that it has a potential future for ordnance materiel, he said. However, he complained that Ordnance has no intimacy with the malleable industry.

"There are certain things about the malleable industry which I do not

## ♦ ♦ ♦ New Directors of AFA ♦ ♦ ♦



D. P. FORBES



MAX KUNIANSKY

understand," he said. "We have no intimacy with the industry such as we have with the cast steel industry. A great part of such advances as have been made have been initiated by Ordnance, not industry. "The industry should flood Washington, not with men but with ideas."

The colonel asserted that the trend to mobility rather than mass puts some limitation on gray iron castings.

The first woman lecturer ever to address the Association was Miss Sara Southall, supervisor of employ-

ment, International Harvester Co., and WMC consultant. Miss Southall predicted that nearly every foundry management, whether it as yet realized it or not, would, within the next six months, find it necessary to employ women.

She recommended that the required washroom and rest room facilities be planned at once, since the difficulty of obtaining materials for these facilities in many instances holds up the employment of women. In reply to a question as to whether the Harvester company has segregated facilities for white and colored women, Miss Southall said that in no northern states was segregation practiced.

She described the Harvester com-

**F**IRST luncheon meeting of the AFA cupola research project committee, with R. G. McElwee, chairman, presiding at the head of the table.





H. REITINGER



R. M. JACOBS



W. B. WALLIS

pany's successful plan for training women supervisors, of which the company now has 30 or 35, and recommended similar supervision programs for foundries.

Warning against either coddling women workers or neglecting to take the trouble to train, adjust and understand them, she said neither of these methods works out as well as a middle course. In following such a middle course, the Harvester company depends largely upon its women supervisors, she said.

She reported that while in some states the weight a woman can lift is regulated by law, a rough guide to this problem has been provided by a group of industrial physicians, whose report has not yet been published. Their consensus is that a woman should be able to lift about 50 per cent as much as a man. The physicians found that age was extremely important, with most backstrains, for both men and women, occurring after the age of 40.

The technical sessions covered a variety of interests. Particular interest was shown in the symposiums on heading and gating conducted by W. G. Reichert, the one on malleable iron melting practices, the one on manganese bronze and the one on gray cast iron as an engineering material. Too, the meetings sponsored by the cupola research committee attracted heavy attendance.

A list of the technical papers presented at the meeting, some of which are abstracted in this report, was published in the April 22 issue of THE

IRON AGE. Copies of the papers may be obtained from the American Foundrymen's Association, 222 W. Adams Street, Chicago.

The annual dinner on Friday was highlighted by talks by Dwight Griswold, governor of Nebraska, and Lt. Col. J. M. Colby, chief of the development branch, Tank-Automotive Center for Ordnance Department, who gave American tanks credit for the German defeat in North Africa. Col. Colby, who was with the British Fourth Army during the November and December battles in which Rommel was chased from Egypt to Algeria, said that in the first 10 days of the battle the percentage of American tanks rose from 36 to 71 per cent, even though they were taking the brunt of the fight. In 32 days of continuous combat, he said, with some of the U. S. tanks traveling as far as 2200 miles, there were only 12 mechanical failures.

He credited cast armor with much of the tanks' success, and predicted that future tanks will make greater use of cast hulls.

The annual business meeting on Thursday included election of new officers for 1943-44, the presentation of three awards for outstanding achievements and the first AFA Foundation lecture by J. W. Bolton.

Lee C. Wilson, Reading Steel Casting Division, American Chain & Cable Co., Reading, Pa., was elected president, and R. J. Teetor, Cadillac Malleable Iron Co., Cadillac, Mich., vice-president. New directors are D. P.

Forbes, Gunite Foundries, Inc., Rockford, Ill. (the retiring president); Roy M. Jacobs, Standard Brass Works, Milwaukee; Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va.; H. Reitinger, U. S. Pipe & Foundry Co., Burlington, N. J., and W. B. Wallis, Pittsburgh Lectromelt Furnace Co., Pittsburgh.

The three foundrymen honored at the meeting for their contributions to the industry were Rufus F. Harrington, Carl F. Joseph and Stanley W. Brinson.

Harrington, who is foundry superintendent of Hunt-Spiller Mfg. Co., Boston, was awarded the John A. Penton gold medal for outstanding pioneering work in foundry sand control.

The William H. McFadden gold medal was presented to Joseph for his metallurgical and shop practice contributions to the foundry industry, especially the malleable iron section.

Stanley Brinson, master molder, Norfolk Navy Yard, Portsmouth, Va., was awarded an honorary life membership in the association for his valuable contributions to the association and the foundry industry.

The distinction of presenting the first AFA foundation lecture was accorded John W. Bolton, director of testing and research, Lunkenheimer Co., Cincinnati. Bolton, nationally known as an authority on foundry metallurgy, spoke on "Foundry Metallurgy and the Castings Industry."

While space limitations do not per-

## New AFA President



L. C. Wilson

If the American Foundrymen's Association were looking for a man who has a wide grasp of foundrymen's problems and a sound, diversified background in foundry work, and who holds the respect and confidence of all foundrymen, it found him in Lee C. Wilson, who has been chosen to assume the presidency of the association for 1943-44. Mr. Wilson is admirably suited to carrying forward the aims of the association which were so ably furthered during the difficult days of 1942-43 by D. P. Forbes, who Mr. Wilson succeeds.

A graduate of the Sheffield Scientific School of Yale, Mr. Wilson's first commercial association was in the sales department of the Harbison-Walker Refractories Co. Later he joined the staff of Chain Belt Co., Milwaukee. Following this, he became associated with Federal Malleable Co., Milwaukee, as, successively, secretary, vice-president and general manager. Leaving Federal, Mr. Wilson became affiliated with the Reading Steel Division of American Chain & Cable Co., Inc., Reading, Pa., where he now serves as general manager.

The new president has served the association in many capacities—as vice-president, as a director, as chairman of the committee on impact testing of the Steel Division, as chairman of convention sessions and as AFA representative on the ASTM committee E-1.

mit a complete discussion of Bolton's paper, this much can be said without hesitation: It is must reading for both users and producers of castings. Bolton's quiet humor, his keen, scientific mind and fine sense of values are combined to make his lecture not only instructive, but also good reading.

It would be hard to point out a subject not covered in the lecture. It is not a back-slapping effort for the industry; to the contrary, Bolton, with the touch of an elder statesman, has exposed some of its foibles, as when he gently chides the industry for the use of elaborate trade names to conceal quite ordinary products. He called it "intellectual dishonesty" for a founder to claim that his "XYZ alloy is the missing link between cast iron and steel" and to avoid comparison by actual independent tests.

Nor does he berate specifications and testing methods as media for driving an honest foundryman out of business. To the contrary, he contends that they can be used by the progressive foundryman to better his own position and the competitive position of the industry as a whole.

One eminent foundryman succinctly summed up the general feeling when he said the importance of Bolton's paper "will increase with time." Perhaps the best description of the lecture's value is a paraphrasing of its own closing words: Younger men will find therein some encouragement toward progress in the science and art of foundry metallurgy and their seniors will be reminded that there yet remains much for them to accomplish through consistent plan and concerted action.

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## Light Metal Sand Practice, Inspection

The new baby of the association, the aluminum and magnesium division, participating as an individual unit for the first time, got off to an aggressive start at this meeting, threatening the role of the steel division as one of the association's most active sections.

Papers and informal sessions of aluminum and magnesium covered a variety of subjects. Sands, in particular, came in for recognition and heated debate.

A. E. Cartwright, chief metallurgist, Robert Mitchell Co., Ltd., Montreal, described the sand practice of the Mitchell company, the output of which consists primarily of aluminum and magnesium alloy castings for aircraft structural parts.

Most of these castings are produced by machine molding, using Tamastone match plates and snap flasks. Synthetic sand, made of white silica sand containing no original binder and bentonite, is standard practice in this shop.

Two grades of silica sand are used, one a coarse type, the other fine. In grain analysis of the coarse grade, the bulk of the material retained is between the 50 and 140 mesh screen (17.40 per cent retained on No. 50, 29.40 per cent on No. 70, 33.10 per cent on No. 100 and 11.40 per cent on No. 140) with nothing left in the pan.

The fine sand is centered largely between the No. 100 screen and the pan (18.36 per cent retained on the No. 100 screen, 22.96 per cent on the No.

140, 19.10 per cent on the No. 200, 22.10 per cent on the No. 270, and 13.10 per cent on the pan).

The heap sand was originally composed of 50 per cent each of these two sands and contains 5 per cent bentonite worked at 4 to 5 per cent moisture.

The company endeavors to use facing sand exclusively, with the present use of facing being limited only by muller capacity. Most of the snap flask work utilizes facing sand prepared (with heap sand as a base) with the addition of new silica for maintaining the heap and governing surface fineness.

The sand is constantly tested in the mixing department, with moisture maintained at 2½ to 3 per cent.

Cartwright reported that the use of facing sand thoroughly controlled, especially as to moisture, has proved one of the most effective means of reducing and preventing losses due to porosity and blow holes at the radiographic inspection. Backing sand qualities are, in this practice, less significant and a wider variation in properties is permissible.

The use of controlled facing sand, he said, was particularly advisable in magnesium practice as a ready means of controlling the quantity of inhibitors used and of reducing the total quantity of sulphur required for adequate protection against burning. Inhibitors in backing sand are adequately maintained by the residue left by the facing sand dilution. Facing sands for magnesium alloys, for most

purposes, contain 5 per cent sulphur and 0.5 per cent boric acid.

Cartwright listed the following as the average range of qualities of the molding sand:

Aluminum heap	Per cent	Moisture, Per cent	Permeability No.	Shear Strength, lb.
Aluminum facing	4.0 to 5.0	40 to 60	3.0 to 4.0	
Magnesium heap	2.5 to 3.0	30 to 50	3.0 to 3.5	
Magnesium facing	4.0 to 5.0	80 to 90	3.5 to 3.0	
	2.5 to 3.0	50 to 80	3.0 to 3.5	

The base sand used for cores is the same as that used for molds. Fine and coarse silica sands are mixed, not usually finer than 50 per cent each, frequently 100 per cent coarse; and occasionally for very large open cores, some 20 mesh sand may be included.

Binders used were listed as bentonite 1.50 to 3 per cent, cereal binder 1 to 3.0 per cent, core oil 25 to 50 to 1 parts, water 6 to 9 per cent. The exact proportions, depend upon the type of cores being made. Cartwright was most enthusiastic over the advantages of the use of synthetic sand.

Characteristics of molding and core sands used by Bendix Aviation Corp. were discussed by A. V. Lorch, of the Eclipse Foundry Division, Bendix, N. J. The sand used at Bendix is conditioned for the batch piles by means of aerators, while sand for the hopper system is conditioned in large nullers which Lorch reported were more efficient and gave more uniform results than were obtained with batch pile conditioning by aerating.

Because of lack of mulling equipment, a natural bank sand of the Albany type is used in the batch piles. This sand has an AFA fineness of 120 and a clay content around 10 per cent. However, in using the conveyor system it was found that natural sands were unsuitable as clay balls were formed as the sand passed along the conveyor belt, in addition the mulling action broke down the sand into fines. Because of this, a synthetic sand has been utilized which yields superior results both as to physical properties and texture.

This synthetic sand consists of a sharp grain Silica, with a clay addition of the bentonite type. Batch piles need 6 to 8 per cent moisture to develop proper green strength, while synthetic sands require 3 to 4 per cent moisture for properties superior to the natural sand.

Discussing inhibitors, Lorch said that an approximate analysis of inhibiting agents present in the sand is obtainable by determining the water soluble content of the sand. This is an indication of total inhibiting agents present, exclusive of S<sub>2</sub>. Chemical analysis of the inhibitors will be put

into practice in the near future, he said.

Core sands used in blower machines are a round grained silica sand, with an AFA fineness number of 80. It has

Moisture is held in the range of 3.9 to 4.3 per cent at the muller, with about 0.2 per cent lost by the time the molder gets the sand.

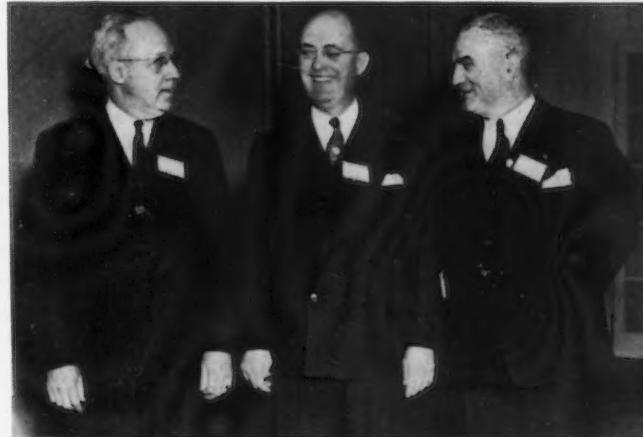
Green compression strength is controlled at 7.5 to 9.0 lb. per sq. in. by varying additions of bentonite. Green permeability usually varies from 70 to 90. If it is felt necessary to change this range, either a change of base sand or an adjustment of the dust collecting system can be made. It was stressed that a little change in the dust system is often more potent than anything else that might be done.

The amount of protective agent is controlled by carrying about 3 per cent total water soluble matter, with additions of Dow No. 190 made to each

a low green strength and a dry tensile of about 100 lb. per sq. in. Little or no water is added to this mixture.

Core sands for hand ramming consist of a mixture of equal parts of a round grained Silica with a fineness

RECIPIENTS of AFA awards were (left to right) Rufus F. Harrington, Carl F. Joseph and Stanley W. Brinson.



number of 80 and a sharp grained silica with a No. 160 fineness. Core oil is added in various proportions and a dry cereal binder is also added to increase green strength.

All cores are baked for 3 hr. at 450 deg. F. If the cores are to be used for magnesium castings they are sprayed with a saturated solution of ammonium borofluoride and ammonium fluoride and dried for 10 to 15 min. at 400 deg. F.

The sand practice of the Dow Chemical Co. at its Bay City (Mich.) Dowmetal Foundry were touched upon by F. S. Brewster.

The base sand at the Dowmetal Foundry is a No. 90 AFA fineness local bank sand, bonded with bentonite and protected with Dow No. 190 agent. Brewster stressed the importance of the control of moisture. Dow keeps a man stationed at the nullers, he said, who determines moisture by the Alpha Lux method on as many batches as time permits.

Incidentally, Brewster made the comment that the Alpha Lux method was not only rapid but the only method they knew that does not introduce errors due to volatilized agent.

shift to maintain this figure. No facing is used in this plant, and all jobs use the same sand.

Two main types of core sand are used, a jacket sand of 1 lb. per sq. in. compression strength and 180 lb. per sq. in. baked tensile, and a hub sand of 1.5 lb. green compression and 150 lb. baked tensile. The base sand is a local dried bank sand of 60 to 70 AFA fineness.

Moisture is held to 6 per cent for jacket sand, 4 per cent for hub sand and 2 per cent for blow sand. Because green strength is critical on the hub sand, adjustments are made with bentonite and corn flour to hold it steady. The baked strength on all mixes is controlled from day to day by varying the amount of core oil. From 4 to 5 qt. of oil are used for 900 lb.

During the discussion of these papers, it was brought out that one company is experimenting with the use of an X-ray defraction test on the water soluble matter to determine exactly what compounds are in it.

The importance of eliminating variables in the raw materials in order to hold physical properties of the mixes

(CONTINUED ON PAGE 170)

# War Problems Dominate

WITH a new record of 826 production executives, operating men, metallurgists, and Army and Navy officers in attendance and a normal three-day program compressed into two days, the 26th conference of the National Open Hearth Steel Committee and Blast Furnace and Raw Materials Committee of the American Institute of Mining and Metallurgical Engineers, held last week in the Statler Hotel, Cleveland, moved at a fast pace to cover all the material and personnel problems engendered by an all-out war effort.

In opening the meeting, L. F. Reinartz, of Armco and general chairman of the Committee, pointed out that most of the new open hearth installations have been completed and many other shops have been remodeled and rebuilt so that the task, from now on, will be to maintain the very high rate of production already attained.

Since the human element is the most important factor in steel production, considerable attention should be given to (1) good personal relations with the working organization, (2) careful training of workers, and (3) continued intelligent maintenance of equipment during these high-speed operations. The rebuilding of open hearth furnaces must be accelerated. Changes must be made in the physical condition of fine ores to make them acceptable and safe for charge ore purposes when used in high hot metal operations.

In this connection, Mr. Reinartz stated that it is interesting to observe that for the efficient reduction of iron from iron ore, the introduction of a high percentage of hot metal into open hearth furnace charges is now practical and is probably much cheaper and more desirable than using the product of the much publicized and popular (in Washington, at least) direct reduction iron ore process.

The type of fuel used in the open hearth furnaces should come up for serious consideration this summer. Every steel plant management should show Washington officials that from the standpoint of sustained produc-

tion, low gravity fuel oil should continue to be made available to steel companies for use as a fuel in open hearths. Cutting of fuel oil by the addition of lighter gravity oils may appear to save fuel oil, but decreased tons per hour in production, increased gallons of oil per ton, and increased furnace repair delays have been the result of such a policy to date. Changes from fuel oil to natural gas as a fuel will decrease production about 10 per cent. If steel plants must return to the use of producer gas as a fuel in the open hearth furnaces a decrease in production of 10 to 20 per cent can be anticipated in shops already equipped with gas producers. Many tons of strategic steel would be required to re-equip other shops. The decrease in production during 1943 and 1944 would be even greater in such shops due to the time necessary to rebuild furnaces and to

train open hearth organizations to use producer gas as a fuel.

The quality of steels for certain important war purposes must be safeguarded and improved. That means raw materials, especially scrap iron, must be segregated and sorted so as to conserve valuable strategic nonferrous metals such as chromium, copper, nickel, molybdenum, etc., and to be sure that scrap of questionable quality is used in grades other than high quality war steels.

Collectively, it should be impressed upon government officials in the Raw Materials Section of the Iron and Steel Division of WPB that there is little progress being made in the segregation of alloy and common machine shop turnings and borings. The future use of large quantities of turnings in open hearth charges will be dependent on such improved segregation.

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## Manufacture of NE 1330 Steel by the Practical Open Hearth Melter—McKune Paper

**T**HIS year the McKune Award paper was presented by Ernest Wigfield of Harrisburg Steel Co., and dealt with the problems of producing NE 1330 steel. Mr. Wigfield pointed out that back in 1932 he became convinced that by the use of silicomanganese, it should be possible to overcome recurring obstacles in the manufacture of NE 1330 steel.

Prior to the 1932 conference, 15 per cent silicon pig had been used in the manufacture of this steel. With this practice, it was necessary to kill the heat at 0.14 carbon, by adding 2950 lb. of ferromanganese. Due to the low carbon content of the heat before killing and the excessive amount of ferromanganese necessary—which often resulted in a cold heat—the heat was missed frequently. As the result of this early in 1933 the production of our first heat of NE 1330 steel using silicomanganese, in one of our 50-ton basic open hearths was carried out. The most difficult problem encountered in changing practice was the education and training of first helpers and melter fore-

men in the new technique necessary.

The first step in cold charging involves the addition of 6000 lb. of heavy melting scrap, placed by the charging machine on a basifrit bottom. Special attention is directed to this type of bottom because, after ten years experience it is believed that the basifrit bottom reduces to a minimum the chances of losing the heat. The charging machine next adds 4800 lb. of limestone and 4000 lb. of lime or the equivalent in the combined weight of both limestone and lime of 8 per cent of the total metallic charge. The remainder of the first metallic charge consists of 27,000 lb. of steel scrap and 22,000 lb. of cast iron.

This first charge should be melted down in approximately 3 hr. and at this point, the balance of the charge, consisting of 33,000 lb. of steel scrap and 22,000 lb. of pig iron, are added. From this point on, approximately 4 hr. are needed to complete the melting of the heat.

Special emphasis should be placed upon the fact that all the cast iron

# Open Hearth Conference

was included in the initial charge; this is a time saver because charging of cast iron scrap—which may vary greatly in size and weight—usually requires more time than when pig iron is charged. An additional advantage is that it is not necessary to take the oil off the furnace while adding the final charge and a higher total  $\text{Fe}_2\text{O}_3$  in the slag is guaranteed when the heat is entirely melted.

Using the component parts of the charge in the order and in the exact weights as previously described, it will usually be found that the heat will melt at approximately 0.40 carbon. This percentage is ideal for this type of steel and in addition, it offers many advantages to the smaller plant which rarely has facilities for manufacturing its own pig iron although it has access to unlimited quantities of steel scrap.

From the foregoing, it can be seen that 7 hr. must elapse from the time charging is begun to complete melting of the heat. This occurs under ideal conditions only and it is necessary that the melter should determine at this point whether the heat is completely melted. The best method is to insert a 15-ft. stirring rod into the bath, allowing it to touch the bottom of the furnace and then slowly moving the bar with a forward and backward motion. If no unmelted portions are felt with the stirring rod, it is reasonably sure that the heat is ready for working.

The chemical analysis toward which the melter must strive in manufacturing NE 1330 steel ranges from 0.28 to 0.33 carbon, 1.60 to 1.90 manganese and 0.20 to 0.35 silicon. Sulphur must be 0.045 maximum and phosphorus 0.040 per cent maximum.

Since the slag at this point is very heavy, it is impossible to obtain a viscosimeter test. The melter, therefore, use 75 lb. of fluorspar in each one of the furnace's three doors or a total of 225 lb. This addition will produce a fluid slag in approximately 20 min., thus making possible within a relatively short time the continuation of the working of the heat.

When the slag is sufficiently fluid, the required tests can be made. These

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**... Discussions cover training and integration of high percentages of women; manufacture of NE steels; utilization of steel turnings; residual metals in scrap; high hot metal charges; etc.**

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are, in the order named, the viscosimeter test, the slag test, the carbometer test and a steel test which is sent to the Laboratory for sulphur and phosphorous determinations. These tests usually require approximately 30 min. and the temperature of the furnace should be maintained at a maximum during this interim, using oil with steam pressure at 80 lb.

The results of the tests should be as follows: a viscosimeter reading of 5 in.; total  $\text{Fe}_2\text{O}_3$  in the slag of 12%; 0.040 sulphur in the bath; phosphorus in the bath of 0.020 and carbon 0.40. A carbon test should also be run at this time on the carbometer, as well as second tests for viscosimeter reading and slag. The former should show 0.25 carbon, the viscosimeter should remain at 5 in. and the percentage of  $\text{Fe}_2\text{O}_3$  in the slag should be 15.

One thousand pounds of spiegel containing 4% carbon, 19 to 21% manganese and 1 to 2% silicon are then added, which will require 30 min. at maximum furnace temperature to melt. When this is completed, another carbon test of the bath should be taken, which should show 0.25 carbon.

The ideal carbon needed to meet the chemical analysis at this point is 0.18. To obtain this, maximum furnace temperature must be maintained for an additional 30 min. during which time the melter must use stirring rods constantly in the bath.

A viscosimeter test, a slag test, and also a steel test should be taken from the heat at this time and sent to the laboratory for carbon and manganese determinations. Assuming that the viscosimeter reading is 7 in., the total  $\text{Fe}_2\text{O}_3$  17%, carbon 0.18, and manganese 0.30, the bath is ready for the silicomanganese; hence, 1000 lb. of silicomanganese are added to the bath, allowing the oil to remain on the furnace for 5 min. under 80 lb. of steam pressure.

At the expiration of 5 min., the oil must be shut off because this lapse of time will ordinarily prove amply sufficient to melt the silicomanganese. The oil should be kept off the furnace for 10 min. to stop any action in the bath and at the expiration of this period, the heat is "dead killed." At this point, there remains approximately 10 min. time before the laboratory reports the percentage of carbon and manganese. The oil is then turned on with 40 lb. of steam pressure. During the remaining 10 min. period, the melter awaits the laboratory reports of the carbon and manganese determinations of the bath prior to the time the silicomanganese was added.

If the laboratory reports are satisfactory, additional tests must be taken to determine the condition of the slag and the steel. These include a viscosimeter test, a slag test and a steel test which should be sent promptly to the laboratory. The steel test requires only another manganese determination. All of these final tests will require approximately 15 min.

As soon as the final tests are taken, 2000 lb. of 80 per cent ferromanganese (6% carbon) are added to the heat and the steam pressure of the furnace is immediately increased to 60 lb. The 15-min. period required by the laboratory to complete the final tests will allow sufficient time, under ordinary circumstances, to melt the manganese completely. This, however, should be determined by stirring rods.

As soon as the final results are received, the bath is ready for the final adjustment. If the heat has proceeded true to form, these results should show a viscosimeter reading of 3 in., total  $\text{Fe}_2\text{O}_3$  in the slag of 14% and the steel test should show 0.72 manganese. Under these conditions, the final addition is 100 lb. of 80% ferromanganese.

In melting the heat, furnace and steel temperatures are very impor-

tant. Throughout the melting process, the amount of steam pressure to be used with oil should be specified to give the melter a definite procedure to guide him. During the melting of the 80% ferromanganese, the same amount of steam pressure should be used on every heat because the eye is the only true method of observing the reactions of the bath in making this type of steel.

As soon as the final addition of ferromanganese is made to the bath, the second helper should start to open the tap hole. Generally, this takes about 5 min. time with the use of oxygen which is more than ample to complete the melting of the final addition of ferromanganese. While the tap hole is being opened, a viscosimeter test and slag test are taken. The viscosimeter reading at this point should be 10 in. and the slag test should show 17% total  $\text{Fe}_2\text{O}_3$ .

When the tap hole is open and the molten metal begins to flow down the runner, ladle additions are made. These additions are 600 lb. of ground

(8 mesh) 50% ferrosilicon, 50 lb. of virgin aluminum and 100 lb. of ferrocobaltitanium. Within 6 min. time from opening the tap hole, the heat will have been completely tapped. Using an optical pyrometer, an observer has been determining the temperature of the molten metal; this should be approximately 2940 deg. F. The heat is then held in the ladle for 8 min. before pouring.

The final chemical analysis should be: carbon 0.31, sulphur 0.22, phosphorus 0.19, manganese 1.77 and silicon 0.28, and the elapsed time should be about 9 hr. and 30 min.

Using 15% silicon pig in the manufacture of this steel, the open hearth's efficiency in meeting the manganese specification in 1932 was 48%. This means that a little more than half of our heats were being missed. With the introduction of silicomanganese in the manufacture of NE 1330 steel, the efficiency dropped in 1933 to 43.1. It was discovered later that the drop in efficiency resulted from the failure to analyze the slag for  $\text{Fe}_2\text{O}_3$  content.

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## Silicomanganese Used to Conserve Manganese and Aluminum

NOW that the pressure is increasingly severe on silicon and aluminum has long not been available, the possibility of employing silicomanganese as a furnace block is receiving a great deal of attention. Bob Good of The Electro-Metallurgical Sales Corp. stated that conservation of manganese and aluminum in steel production through the use of silicomanganese involves a consideration of the charge, the type of furnace, the slag, the type of steel to be made, facilities for rapid carbon determination, and the experience of the melter. It involves further the efficiency of production of the alloys and the availability of raw materials.

Based on the relative weights of  $\text{FeO}$  that might be reduced with silicomanganese or standard ferromanganese and aluminum, the following may be noted:

1 lb.  $\text{SiMn} = 1 \text{ lb. FeMn} + 0.2 \text{ lb. Al}$

Respective costs to reduce the same amount of  $\text{FeO}$  are approximately 6c. and 7.8c.

which indicates silicomanganese offers some economical advantages where deoxidation only is desired. When used for alloying purposes only the following is derived:

1 lb.  $\text{SiMn} = 0.84 \text{ lb. FeMn} + 0.37 \text{ lb. } 50\% \text{ FeSi}$

Comparative costs are approximately 6c. and 6.4c.

Additional advantages accrue to the steel maker favoring silicomanganese in the amounts of carbon introduced with these several alloys, according to Mr. Good.

Emergency restrictions in the use of aluminum have prohibited its use for all practical purposes as a furnace block on the carbon drop, so that the operator must resort to a silicon alloy. Mr. Good said that experience indicates silicomanganese acts faster and more effectively than any grade of ferrosilicon. In addition to its immediate action on the oxygen in solution, it evolves heat and promotes the formation of a fusible silicate in comparison to an infusible form of  $\text{SiO}_2$ . This difficultly fusible form of  $\text{SiO}_2$  formed when 15 per cent ferrosilicon is added apparently holds by

adsorption either  $\text{CO}_2$  or  $\text{CO}$ . Subsequent additions of a high carbon ferrochrome or ferromanganese often react causing the slag to foam, whereas no foaming occurs when high carbon alloys follow an addition of silicomanganese, thus indicating the steel has been killed more effectively.

When silicomanganese is used primarily to block the carbon drop by counteracting the dissolved oxygen, economy is served best by adding just enough to hold the carbon stationary while the other alloys are being dissolved, and a rough rule of thumb to follow is to add one point of silicon for each percent of  $\text{FeO}$  in the slag, which will hold the carbon constant from 1 to 1½ min. for each point of silicon added. For example, take a 0.15 carbon heat with a slag containing 12 per cent  $\text{FeO}$ ; here an addition of 0.12 per cent silicon as silicomanganese (1400 lb. per 100 net tons of steel) will maintain a uniform carbon from 12 to 18 min., depending on the sharpness of the flame, the ratio of slag metal interface area and depth of bath plus the temperature. When used in this manner no reversion of phosphorus will occur.

Three times this amount has been used successfully without rephosphorizing the heat where it was used as an alloying agent as well as a carbon block, but a previous addition of burned lime is necessary.

Smaller amounts, according to Mr. Good, are likewise proving useful in high carbon heats, in fact are desirable, since a heavier addition can quite easily prevent any manganese loss, whatever, and it is logical to expect the cleanest steel can only be made when  $\text{MnO}$  formation accompanies the development of  $\text{SiO}_2$ .

While the amount of rimmed steel currently made is far less than that common to normal times, it has been proved that silicomanganese may be used in the furnace to conserve normal additions of aluminum later—the amounts added being only one-third or one-fourth of those mentioned earlier.

According to Mr. Good, production of this alloy will be increased within 45 days and demand will likely be satisfied.

## Alloy Turning Utilization, Scrap Segregation Are Major Problems

THAT the steel industry is beset by many problems in its increased dependence on turnings as a scrap source was evidenced by the very brisk discussion on this subject.

Wedded to this problem of turnings is the equally complex problem of alloy scrap segregation.

Mr. Barringer of the Institute of Scrap Iron and Steel, while reporting

the pleasant news that the over-all scrap supply picture is far more comfortable than it was a year ago, also took pains to emphasize the fact that perhaps one-half of purchased scrap soon will have to be made up of borings and turnings. The yearly tonnage may run as high as 7,000,000 gross tons.

Most mills currently are approaching 10 to 20 per cent turnings in their scrap charge, and all mills have had serious difficulty because of this practice. Much of the turnings shipments are oily and greasy, but even more serious, the shipments are almost inevitably badly mixed, with all types of analyses represented. Not only does this result in serious loss of strategic alloying elements, but frequent heats are spoiled. Furthermore attempts of segregation at the mill are at best only a partial answer to the problem, and a production decline inevitably accompanies the jump in off-heat percentage as the turnings percentage goes up.

It has become obvious that the WPB will have to intensify its educational campaign at the source of turnings, to keep the material clean and well segregated. This is admittedly a very difficult task and one which will take some time. As this educational campaign progresses, more accurate systems will have to be set up to channel this segregated scrap back to the mills. As a considerable volume of battlefield scrap is now building up at foreign ports, the steel industry will likely soon be receiving lots of this type of material, which will be an even more complex analyses conglomeration than has been the case for turnings. Here again there is going to have to be a lot of inspection, spot testing and supervision if serious numbers of off-heats are to be avoided.

On this subject, W. E. Buck, of Continental Steel Corp., pointed out that the most recent specifications for turnings are set forth in the amendment to Price Schedule No. 4, effective Jan. 22, 1943. They are:

#### Machine Shop Turnings

Clean steel or wrought iron turnings, including high sulphur shell turnings, free of cast or malleable iron borings, non-ferrous metals in free state, scale, or excessive oil. May not contain badly rusted or corroded stock.

#### Shoveling Turnings

Clean short steel or wrought iron turnings, including high sulphur shell turnings, drillings, or screw cuttings. May include any such material whether resulting from crushing, raking

## Women in Steel Mills

THE open forum on the place of women in the steel industry, in the opening morning session of the basic open hearth committee, disclosed that women already were flowing into all departments of American steel mills. Republic alone has over 5000 women working in its plants, and all other mills recognize that before year's end the use of women will likely approach the British level of some 12 to 15 per cent. Of obvious necessity is the application of special techniques in handling women. Skilled female supervisors are necessary, and special locker and comfort facilities are demanded by law; safety clothing is imperative, and safety shoes, for instance, are not yet readily available; clothing must be attractive, and must vary according to the limitations of work done, and particular trouble is being experienced in the case of hair protection—hair covering should be attractive as well as functional, although an actual scalping accident in a plant is usually necessary before strict adherence to hair protection is achieved. By and large, the use of women so far in American mills has resulted in no loss of efficiency, and in certain instances there has been a gain in efficiency and a drop in absenteeism.

Earl Smith, of Republic, speaking on the use of women in British mills, mentioned that they frequently worked on

very difficult tasks, as for instance on swing grinders and in chipping beds. Mentioning specific statistics on the use of women in British plants, a representative month in 1942 showed the following breakdown:

	Males	Females
Iron ore mines . . . . .	6,354	81
Iron ore quarries . . . . .	3,082	12
Sintering plants . . . . .	532	21
Blast furnaces . . . . .	11,734	244
Steel melting furnaces . . . . .	23,712	1,137
Rolling mills . . . . .	42,662	5,602
Sheet making		
(a) Rolling mills . . . . .	9,017	411
(b) Finishing processes . . . . .	6,070	1,572
Tin plate manufacture . . . . .	10,415	2,242
Forging and allied processes . . . . .	10,769	1,458
Steel foundries . . . . .	22,394	2,474
Wire drawing, rope, etc. . . . .	14,507	6,620
Wrought iron manufacture . . . . .	3,426	171
Tubing and fittings . . . . .	14,624	2,538

Any consideration of these figures in relation to American practice must take into account that steel manufacture here is approximately six times the size of the British industry. Average wages in Britain for the work listed is about £5 2s. per week.

ing or other processes. Must be free of stringy, bushy, tangled or matted material, lumps, non-ferrous metals in a free state, excessive oil or scale.

#### Baled Machine Shop Turnings

Machine shop turnings hydraulically compressed into bundles weighing not less than 75 lb. per cu. ft. May include not over 25 per cent, by weight, black sheet scrap used for binding or wrapping purposes.

These specifications are perhaps too general, according to Mr. Buck. Such terms as "excessive oil" and "short" might properly be defined and the size of "bundles" might be limited. It would probably be helpful if a maximum length were specified for short turnings, as well as a minimum weight per cubic feet. However, in a comparatively short period of time after specification changes are made, the shippers become more familiar with the needs of the melters and the receipt of scrap settles down to a fairly smooth routine.

Mr. Buck's plant receives machine shop turnings, short shoveling turnings and baled machine shop turnings held together with sheet scrap. It is found that turnings are extremely variable in physical condition. Machine shop turnings may vary from 20 to 60 lb. per cu. ft., and may be too bushy to use because of inability of the magnet to unload and handle

them. In such cases they are rejected and generally show up again in bundles. Some turnings may be bushy but usable, or a mixture of usable bushy and short. Short shoveling turnings may vary from 35 to 110 lb. per cu. ft. All turnings may contain from 3 to 15 per cent oil.

The fuel oil requirement of an open hearth furnace is less than 15 per cent of the weight of the charge, so it can be readily seen this extra oil can be hard on furnace refractories. The use of a large percentage of turnings in the charge may also result in excessive amounts of flue dust.

Mr. Buck said that he has had no experience with degreasing, shredding or centrifuging, although turnings have been received which obviously had been crushed or shredded. Such turnings load well in the charging boxes. No briquettes have been received and Mr. Buck's experience has been that short shoveling turnings are a better buy than baled machine shop turnings.

Turnings ran the gamut of analyses. It is not surprising that they contain more than an ordinary amount of high sulphur free cutting material. Cars often contain copper, brass, white metal and even such rare metals as silver in a free state. Practically all of the alloy steels are represented in Continental's receipts of turnings.

By inspection, analysis and by checking the point of origin, however, Continental is able to hold troubles from the standpoint of sulphur and residual alloys in finished steel to reasonable limits. Without doubt the consistent use of large quantities of questionable turnings will lead to many poor quality heats, as well as heats falling outside the usual chemical specifications, said Mr. Buck.

Much is yet to be learned with respect to the use of turnings in the open hearth charge. With the present high rate of production of turnings of questionable analysis, open hearth operators are faced with the problem of using them to the best advantage. It is felt that the best approach to the problem is by educating the shippers to segregate the various analyses and to separate the long from the short turnings. In this manner, each grade can be shipped to the point where it can best be utilized.

The experiences of Timken with the preparation of turnings for use in the open hearth or electric furnace were discussed by Harry Walther of that company.

Mr. Walther said that briquettes made from steel turnings provide a very satisfactory form of scrap for either electric or open hearth furnaces. For electric usage the preparation should be a little more extensive than is required for the open hearth in order to maintain controlled melting. Since a number of melting shops are now producing by both methods, the preparation of turnings and other forms of scrap as well has assumed added significance in adapting it to each process most economically.

In alloy steel manufacture it is important that the chips be separated into their proper classification for good chemistry control and recovery of essential elements. Furthermore, chips containing soluble oil should be kept separate so that the oil may be recovered after washing and not be mixed with those covered with insoluble compounds. High sulphur compounds are objectionable and should be removed or else sulphur will be introduced into the melt in proportion to the amount of turnings used. Since it is now necessary to use more turnings than ever before, it is good practice to remove the oil before remelting. This is especially true in the electric as oily turnings or briquettes cause high carbon melts, thin erosive slags, requiring much lime and generate excessive fire and heat during the melting period, which is damaging to the superstructure of the furnace

and makes the unit difficult to service. Production is definitely slowed down. Due to the oxidizing nature of the open hearth process, oily briquettes do not cause much difficulty if used in limited amounts.

Loose turnings weigh around 10 to 12 lb. per cu. ft. and may contain as much as 60 gal. of oil per ton, according to Mr. Walther. By shredding and centrifuging they weigh about 30 lb. per cu. ft. and have oil content of 1 to 1½ gal. per ton. These chips then may be charged in the loose state to about 10 per cent of the metal mix without straining ordinary charging facilities or loss in melting time. If more is charged into the electric the chips will tend to fuse and cling to the banks and are difficult to remove. It seems that chips fuse to a more or less solid state before melting. Briquetting eliminates most of the problems surrounding the remelting of turnings. However, crushed and centrifuged turnings do not make a very substantial briquette in the old type machines, making 20-lb. pieces which are 40 to 55 per cent solid. They will disintegrate easily on handling. New machines have been designed which are more powerful and will briquette 8 to 10-lb. pieces to 60 to 70 per cent solid, which are more stable. Briquettes of this type will cause fairly high carbon melts when used very heavily in the electric, but are excellent in the open hearth.

Timken's two original machines were designed to briquette curly turnings. The first was installed in 1923 and the second in 1929, and as conditions permitted have been in operation constantly. By this method the turnings are passed under sprays of water at 190 deg. F. on a continuous belt conveyor. After this washing the turnings will contain about 4 to 6 gal. of oil per ton and considerable water. They are then fed into the briquettes, each of which produces about five

tons of 20-lb. pieces per hr. The briquettes are then passed through a continuous belt conveyor type furnace which is gas fired and maintained at about 1500 deg. F. This operation requires about 35 min. The oil on the surface burns off and that on the inside vaporizes. By controlling the burning carefully, very little oxidation occurs. The hot briquettes are then quenched in water and are ready for remelting. Throughout the process the oil is recovered for reuse. An electric charge may contain 50 per cent of this material with no difficulty in slag or metal control. Briquettes made by this method are to date the most efficient type for use in the electric furnaces, especially when melting the lower carbon grades of steel. It is not necessary to burn the green briquette if used in open hearth charges and up to 20 per cent of the metal mix is the usual practice when the material is available.

Timken has not been successful in briquetting steel turnings, especially alloy, of over 0.45 per cent carbon in these machines and necessarily must charge this material in the loose state. Production is from 4000 to 6000 tons of briquettes per month. Combined with loose turnings, chips and borings, total consumption is 16 per cent of the total charge, in all furnaces. Two new machines of more modern design to press out centrifuged chips are now being installed which will permit this figure to be increased economically. It is believed that this material will be more satisfactory for the open hearth than for the electric.

The cost of briquetting is fully justified by savings afforded in transportation, storage, handling, charging and melting costs. The fire hazard in storage is greatly reduced. The use of briquettes permits greater turning consumption than heretofore with a definite boost in steel production.

## Use of Spectrograph Speeds Production; Has High Accuracy

RESIDUAL elements which are present in the scrap have been determined by taking preliminary tests from the open hearth, according to G. T. Motoek, of Republic. These elements are found in varying proportions. For illustration, a sample taken at random would indicate what to expect in steel made from any unselected scrap. The possible residual elements due to scrap are titanium, 0.008E; vanadium, 0.001E; antimony,

none; arsenic, 0.02 to 0.20E; zinc, 0.001E; copper, 0.10E; boron, 0.0005E; chromium, 0.10E; Molybdenum, 0.010E; nickel, 0.05E; tin, 0.01E;

The fluctuation of the content of the residual elements in steel, after the preliminary test, was observed in relation to furnace additions. By the spectrographic examination of the preliminary and final ladle tests, the following was found:

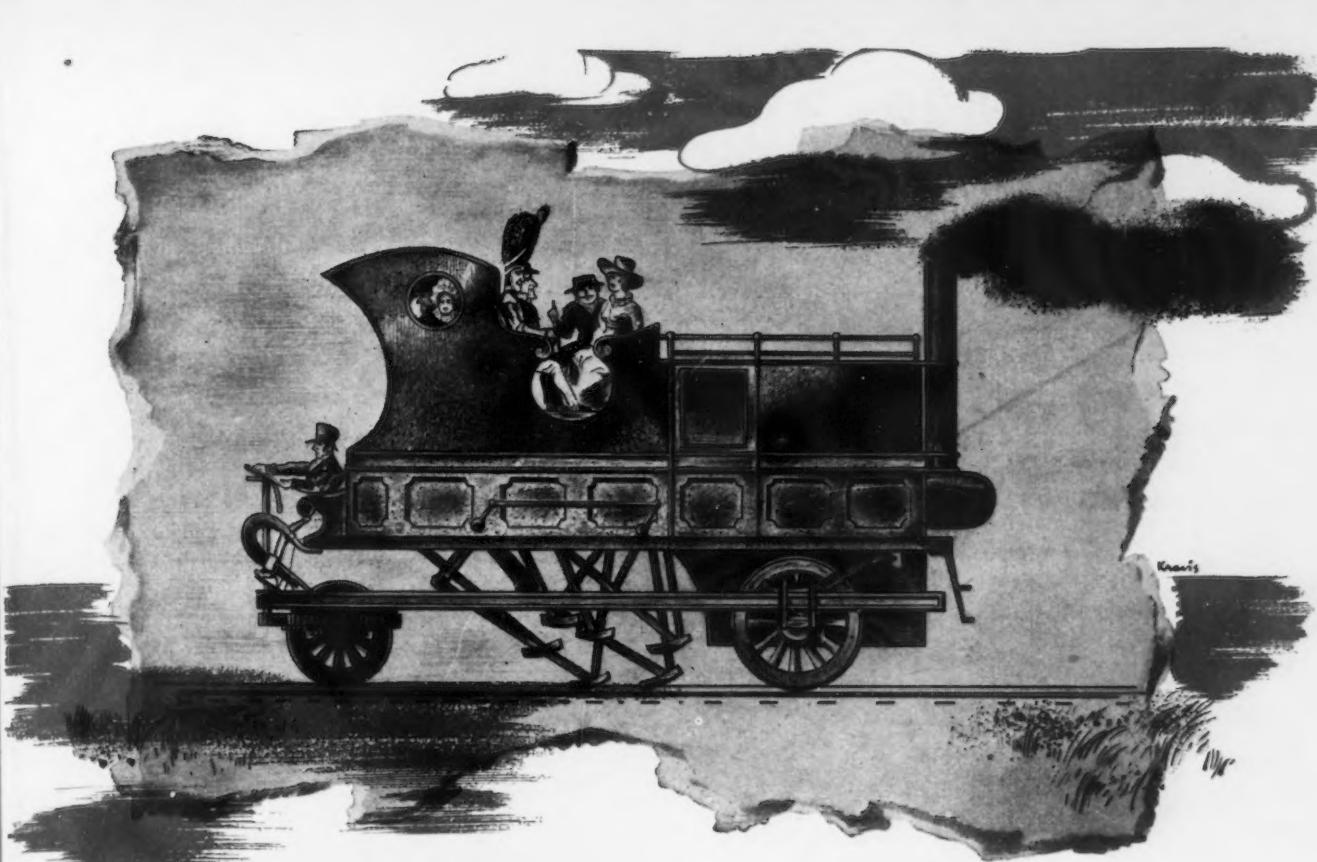
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# Mr. Gordon, You've Got Something There!

And the curious thing is that he had!

That incredible bandwagon is actually the missing link between the Iron Horse and a dray horse. It combined the best features of a locomotive — steam — and a quadruped — legs!

For a horse's legs, brother Gordon reasoned with stirring logic, had always been the extremity of efficient hauling power, hence they always would be. So he built mechanical legs for his dream of motive power. . . . The spirited vehicle pranced itself to pieces, and Gordon's dream was ended.

Yet, in 1824, David Gordon had something that might have made mechanical history. It was traction that he was striving for, never dreaming that the wheels alone would give enough of it to pull his steam-driven carriage . . . while the regrettable legs on that hybrid hack were remarkably close in principle to the caterpillar-type of traction used today on tanks and tractors!

This story has a modern moral. For every engine and every machine that runs today represents many failures, many successes — and many problems that are still in the process of being solved. And in the solutions of those problems lie the great discoveries of the future!

Today, Jones & Lamson engineers and service men are working with leading technical men in virtually every industry and in hundreds of plants, from the largest to the smallest, helping to solve those problems. And behind them is a background of machine tool engineering that spans more than a century of our industrial history — since the days of David Gordon.

No matter what your problem — or when — Jones & Lamson engineers are at your service.

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Universal Turret Lathes • Fay Automatic Lathes • Automatic Thread Grinders • Optical Comparators • Automatic Opening Die Heads



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Profit-producing Machine Tools

# Assembly Line . . .

STANLEY H. BRAMS

- Smaller War Plants program is based on more sub-contracting
- ... Production of civilian trucks will begin later this year ... Pontiac reports on chrome plated tools.



**D**ETROIT—The most intensive share of the efforts of the Smaller War Plants Corp. to funnel armament business into distressed companies will be through wider sub-contracting by prime contractors. That much was indicated when Col. Robert W. Johnson, chairman of the Smaller War Plants Corp., came to Detroit in April for conferences with the automotive industry, which, he admitted, has led the way for the nation in sub-contracting.

Col. Johnson has simmered down his thinking to fundamental objectives. His first move has been to define a distressed plant, now set down as one operating today at two-thirds of its five-year manufacturing average before the war, or, if five-year figures are not available, at two-thirds of its 1941 business adjusted to Commerce Department indexes.

The lean and energetic head of the SWPC believes there are no more than 2500 plants falling in this category throughout the country. A tenth of these lie in the Detroit area; all but a scattering of the rest are in New England, along the east coast and in the central industrial states.

To these companies Col. Johnson holds out the offer of \$1,550,000,000 in business on contracts allotted to SWPC by the armed services, plus small loans to enable a start to production.

A Smaller War Plants specialist has been set up in each of the 12 major WPB offices and is authorized on his own to lend up to \$25,000 for

tooling of small plants for war business. Each district office, meanwhile, has exhibits of the products allocated to it for the finding of manufacturing facilities.

Col. Johnson believes the problem is fundamentally a simple one. He says that the major purchasing agents of the country could entirely eliminate distressed plants within 90 days if they decided it was a good thing to do. In explanation of this statement, he says that a purchasing agent can "cite 47 honest and logical reasons" why he is unable to do business with small, distressed companies; at the same time, the same purchasing agents can find equally valid reasons why they should place business with such concerns. Accordingly, he sees the entire problem as one of a state of mind. He mentions more than casually the fact that it is good sociological judgment to keep small business during the war, thus maintaining the blocks of purchasing power built up in predominantly rural areas.

**T**O alleviate chance worries on the part of big business, he stresses that his objective is the continuance of a status quo in the relationship of small business to big business. In other words, big business will not have to fear it is building up potential competition by extensive sub-contracting.

There are five major categories of purchasers today, says the SWPC head—the armed services, the prime contractors, the state, municipal and country governments, important commercial and industrial civilian business, and the 525 industrial advisory committees of WPB. Of these the prime contractors are currently the largest, inasmuch as the armed services have already placed most of their 1943 commitments. Accordingly, it is in the offices of the prime contractors that Col. Johnson is doing his missionary work.

Each of these prime producers is filling out an involved SWPC questionnaire showing how they develop and allot their sub-contracting arrangements. General Motors, for one, is intensely impressed with this form and, rather than shuddering at one more questionnaire seems to have welcomed this one. GM officials told SWPC people that they expected the thorough compilation of the information wanted would cost a considerable

sum to set up, but that it was worth it.

The SWPC program appears to have definite and obvious merit. However, analysis must be accompanied by a note on the dubious manner in which it is being received in some circles. There is some thinking that SWPC is a political football set up to accommodate inept companies which howl too loudly to their congressmen, one which has \$150,000,000 in capital to be used, not as tooling loans, but as subsidies for weak producers.

SWPC may turn out to be a political agency of this sort; or it may turn out to be a valuable adjunct to the war program and to small business generally. It is seldom that a federal organization has been so quickly able to determine its destiny between two such choices, for the next several weeks will likely see SWPC on one path or the other.

## Civilian Truck Output Ordered

Four weeks ago this column reported that resumptions on civilian goods manufacture were foreshadowed by current developments, augmented in part by the need of providing civilian goods whose lack was said to be noticeable and providing pinches in many quarters.

This production was confirmed in an initial small way last week. The WPB called in truck manufacturers to tell them that they would produce civilian trucks during the last half of this year.

The number will not be large—probably around 6000 to 8000. They will be concentrated in the heavier range of sizes, stocks of which have been all but completely exhausted while the demand has augmented. All manufacturers of heavy trucks will not participate in the program, but most of them will, the determinants mainly being ability to obtain required components and to go into final assembly work without impairing war truck output and without utilizing labor required for direct war work.

The ODT probably will be the claimant agency in this purchasing, and is expected to shortly approve allotments for third and fourth quarter output under CMP. The War Production Board's Automotive Division indicated that it would push action quickly on the program, so that pro-

# HOW FAST... To Victory?

Who knows? But one thing is sure — the thousands of V.T.L.s now in war production will keep whirling until the war is won. Many of them have been working since before Hitler was a corporal — and will still be working when he is a memory. The 60 years of practical engineering experience behind every Bullard Vertical Turret Lathe guarantees the sustained accuracy that modern war — and peace — production demands.



Spiral Drive Vertical Turret Lathes are built in 24", 36", 42" and 54" table sizes. Also Cut Master Vertical Turret Lathes in 74" size with two or three heads.

**THE BULLARD COMPANY**  
**BRIDGEPORT, CONNECTICUT**

duction will be possible soon after June.

Production will be concentrated in three size ranges, roughly grouped around 20,000, 30,000 and 40,000 pounds gross vehicle weight. WPB is seeking to standardize engine installation in these units at 350, 400 and 450 cu. in. displacements, respectively, but this proposal is not meeting with any great favor in automotive circles, inasmuch as most companies' relationships between powerplants and truck sizes are not fixed so rigidly.

The setting up of facilities to resume this production will not be too difficult a task. It can be assumed that virtually all producers to be scheduled for the forthcoming production have been turning out military trucks, hence have assembly lines in fair readiness. Lighter gages of sheet metal than are used on military trucks may have to be ordered by producers who do not have old inventories still on hand, and there will also be required some few components, like padding for seats, which are not standard on all military jobs.

**M**ANUFACTURE of civilian trucks was ordered discontinued in March, 1942, but producers were given permission to run out their stocks of parts and sub-assemblies on hand. In the heavy truck categories this provided limited output which in some cases ran through May of 1942. Since then, however, this country's truck output has been entirely for military uses.

There are some grounds for speculation as to future developments in the truck field. Although heavy vehicles are in extremely limited supply today, light and smaller medium trucks are only slightly more available. Second-hand lots, however, provide a source for some vehicles in these size classifications, particularly since curtailments in delivery schedules have put surpluses in the hands of users like department stores and others.

However, this used vehicle supply will not last forever, and the vehicles in service are being employed in the most complete possible efficiency. With military truck output currently slack and civilian truck demand growing, extension of the civilian truck reconversion can be regarded as a fairly good bet.

#### Gas War and Industry

Hints are increasing that chemical warfare may develop on the battlefields. It is time to take note, therefore, that the Chemical Warfare

Service of the Army has a closer tie than is generally realized with the metal fabricating industries. This relationship, intimate in many details, was recently outlined in Detroit by Brig. Gen. Alden H. Waitt, chief of the Operations Division of the Office of the Chief of this Service.

The CWS is at once an inventor, a developer, and a user, having its technical specialists as well as its fighting arms. Basically its work revolves around three principal phases—the use of smoke, of incendiary equipment and of toxic gas.

In the incendiary sphere, the Chemical Warfare Service calls upon metal fabricators to produce not only incendiary bombs, but flame throwers and supplemental equipment. Flame throwers, greatly improved since the last war, include both portable and vehicular types.

In the "smoke" sphere, CWS depends on armament manufacturers for mortars to throw shells in high trajectory, and orders the shells for such use. In this connection the Army has a new 4.2-in. mortar, which differs from predecessors in that it is rifled to give a spinning motion to the shell, increasing its range and accuracy. The shell fired from this mortar can be used not only for smoke but for high explosive as well, or for gas if gas warfare begins.

**A**LTHOUGH there has been no outbreak in Europe as yet of gas warfare, CWS is well prepared for it, stated Gen. Waitt. Large

**VETERAN 63, APPRENTICE, 16:** John L. Jacobus, first 16-year-old youth to join the apprentice training course of the Westinghouse Lamp Division, Bloomfield, N. J., is being instructed in lathe operation by Thomas E. Norton, 63, foreman and veteran of 28 years with the company. The division has lowered the apprentice age limit from 18 to 16.



stocks of gas masks have been built and are being produced daily, made by not only electrical appliance and other "hard lines" manufacturers, but by shirtmakers and shoemakers also, among others. There are two types of these masks, one for military use and one for civilians. They do not differ greatly except in the longevity characteristics of their filters; the civilian masks, designed mainly as a protection while wearers are moved to safe points, are not as long-lived as are the military masks.

Also involved in poison gas preparations are a variety of decontaminating apparatus, ranging from swabs to fire extinguisher type sprays to neutralize vapor which may cling to equipment or countrysides.

The increasing importance of CWS in the Army scheme of things is typified by its growth in size. A few years ago it had less than 1000 officers and men. Today it has several thousand officers, and additional thousands of men are being turned out.

#### Tool Plating With Chrome

Pontiac Motor Division of General Motors Corp. has reported some of the results of a long term testing program proving the worth of chrome plating on cutting tools.

The experiments have been of such eye-opening variety that most of the cutting tools now used by Pontiac have been ordered chrome plated as soon as they arrived from the manufacturer. The plating is done in 400-gal. tanks. The tool is hung on the reverse bus bar for 20 seconds and then placed on the cathode bar and given a maximum flash of 20 to 30 amperes per square inch. This is maintained for approximately 15 seconds, then tapered off to approximately one-half maximum current density at the end of 30 seconds. Plating continues another 30 seconds at this low rate.

**R**EAMERS used on diesel rocker and injector arms machine an average of 1800 holes before wearout without chrome plating and 2010 with chrome. Flash chromed core drills have a 56 per cent longer life than non-chromed tools used on diesel pistons, it was said.

Before chroming, undersize reamers employed on diesel small parts were reported to average 70 pieces, but the life of such tools jumped to 110 pieces after chrome plating. Tool bits which averaged 23 diesel connecting rods handled 56 after plating. On a tank axle job chrome plated bits averaged 110 pieces against 67 pieces for unplated bits.

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## USE RACO COMPOSITE TYPE D ELECTRODES

Have you looked into the possibilities of using Raco Type D Electrodes instead of shielded arc electrodes?

There are many jobs being done today ... or being held up for lack of shielded arc electrodes ... which could be satisfactorily handled by the use of Raco Type D white coated electrodes.

If you are welding mild steel ... for storage tanks, range boilers or products of a similar nature ... or working with galvanized material ... or producing pans or boxes of lighter gauge sheet metal ... take time to look into the

availability of Raco Type D. The only type electrode readily available that will give results most nearly comparable to Shielded Arc type electrodes.

Many millions of pounds of Raco Type D electrodes have been used for automatic and manual welding for the past ten years by the largest automobile plants where high speed is of primary importance.

We can make prompt deliveries of Raco Type D Electrodes. Samples of standard size electrodes will be promptly furnished on request.

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Makers of Raco Type HD Shielded Arc Electrodes for Stainless Steel, Mild Steel. Raco Type M and Type D Light Coated Electrodes for Manual and Automatic Work. Samples and Literature on request.

# Washington

L. W. MOFFETT

**• Government - fostered monopolies for facilitating war production raise postwar question . . . Steel Division considering use of symbol trains for moving steel to West; ODT and some railroad executives doubt advisability.**



**W**Ashington—The anti-trust laws have been abandoned for all practical purposes for the duration. The de-emphasis on enforcement is so great that many competent observers doubt that any attempts after the war to decrease the size of business units will be availible. Industries and agencies check with the Department of Justice on their actions, but the check is perfunctory.

The government itself is responsible for the change, not perhaps through choice, but because it feels that maximum production and distribution efficiency are to be obtained through the pooling of industrial resources. It has unofficially sanctioned combinations in the aircraft and automotive industries. Combinations of small manufacturers have been permitted to act as one company so that contracting can be spread. All of the weapon manufacturers under the Ordnance Department are in combination, as well as all of the component manufacturers of a kind which are listed in

*See details of a new Component Scheduling Plan on page 154.*

the WPB General Scheduling Order M-293. Industrial integration with the exchange of raw materials designs, jigs, dies and even fabricated parts has become the rule.

While the trend has been apparent for months, very little public notice has been attracted. One reason is that the agencies themselves have soft-pedaled publicity because they have not

thought it politic to advertise that the government just as it did under NRA now is fostering monopolies. The effect of the action will undoubtedly accomplish effective war production but it will also tend to make impossible the entrance of the manufacturer with smaller capital into the fields where extensive combination has been permitted.

**T**HE War Department, WPB, BEW, ODT and OPC have taken advantage of statutes passed last summer to get approval from the Justice Department to do things which would be plain violations of the Clayton and the Sherman Acts, if strict enforcement were being attempted. But the statutes have the effect of relaxing these laws. For instance, WPB Chairman Donald Nelson certifies with the following legalistic mumbo-jumbo "that the doing of any act or thing, or the omission to do any act or thing, by one or more persons during the period that this section is in effect, in compliance with any request or approval made by the Chairman in writing, is requisite to the prosecution of the war . . ." When this certification is made the law provides that "such act, thing or omission shall be deemed in the public interest and no prosecution or civil action shall be commenced with reference thereto under the anti-trust laws

of the United States or the Federal Trade Commission Act."

The Secretary of War had to do a similar thing with reference to Ordnance's "industry integration committees"; the contract pooling arrangement is "kosher." But reports by WPB spokesmen indicate that the "critical component" groups of manufacturers are now in combination and there is no evidence that this and other merging actions have been near the Department of Justice.

The Federal Register, a daily volume of law turned out by Archives, shows that WPB has approved a minor merger of General Electric Co. and Westinghouse Electric & Mfg. Co. with respect to auxiliary turbine generators. The companies will exchange plans, drawings, designs and the pooling of manufacturing information with respect to certain auxiliary turbine generators. Various companies in the shipping container industry have been formed into the Overseas Steel Container Corp. under a plan submitted by Ordnance (Federal Register, Feb. 11). The Army Air Forces authorized electrical manufacturing companies to collaborate.

**T**O maintain stocks needed by steel warehouses in the San Francisco Bay area, WPB got permission from Justice to place in operation a plan whereby replacement orders in less-

**A TYPHOON REVS UP:** This plane, ready for a trip over Holland, is one of the R.A.F.'s new fighters, the Typhoons. Undoubtedly the fastest fighters in the world, they are also the strongest and most powerfully armed single-engine fighters. They have terrific diving power, and can maneuver to match anything the Nazis have put in the air.

*British Combine*



# WHEN THE BIG FELLOWS ARE ON THE LEVEL...

## *They'll Cut Straight*

The principal reason why large milling machines do not cut straight is because of inadequate foundations and lack of attention to periodic and accurate releveling. True enough, once the machine is installed, the operator or department supervisor can do little about the foundation, but they *can relevel the machine periodically*. And it's so easy to do. The little fellow at the right; in the first two illustrations, shows you how it's done on CINCINNATI Hydromatic Milling Machines.

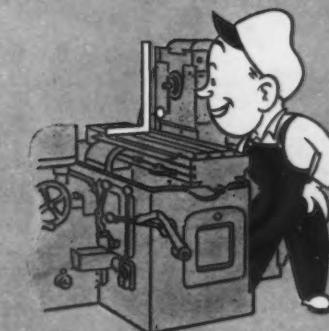
There are other factors, too, in keeping your Hydromatic running continuously while turning out a high volume of accurate work.

1. *Level the machine periodically.* Once every six months should do the job. Leveling blocks should be used for all but the smallest machines.
2. *Follow lubricating instructions.* A lubricating schedule tag tied to the machine serves as a convenient reminder.
3. *Use clean containers for the oil,* especially oil for the hydraulic unit.
4. *Clean the hydraulic oil filter.* Once or twice a month should be sufficient.
5. *Keep the guard in place over the feed trip plunger.* This will help prevent accidents; will keep grit and coolant out of feed trip mechanism.
6. *Loosen quill clamping nut before making quill adjustments.*

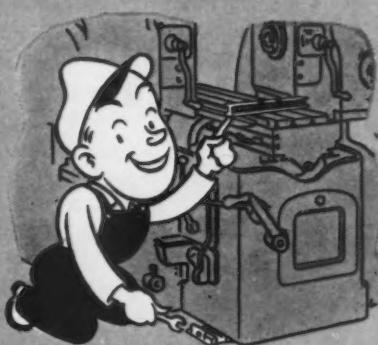
The above routine is just as easy to follow as it looks. Try it—give the machine a chance to make a production record equal to your attendance record.



Below: Milling two sides of Diesel engine connecting rods on a CINCINNATI Duplex Hydromatic. Complete description and engineering specifications of the Hydromatic line may be obtained by writing for catalog No. M-955-1.



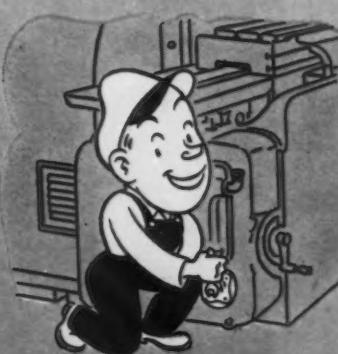
Check the headstock level accuracy by "trammimg", with indicator gage fastened to spindle nose.



Level the machine periodically. It's easier to do and longer lasting when machine is mounted on leveling blocks.



With the guard in place, there's no chance for the operator to get his fingers caught between the table dogs and trip plunger.



With a small wrench, the hydraulic oil filter may be cleaned in a few seconds. Do this at least once a month.

than carload lots of individual warehouses in the area will be grouped by WPB into mill lots and orders placed by it with mills in the name of and shipment to one or more of the participating warehouses (Federal Register, Feb. 16). In addition to maintaining stocks this move is designed to conserve freight equipment and reduce freight costs.

There is no profit sharing in any of the schemes except in the contract pooling of small manufacturing groups, nor any management in common. However, the trends toward larger business units lie in the cooperation companies have entered into to further the war effort.

What may come out of this mutual aid after the war is what is disturbing many industrialists here. These business men say that the larger a business is the more it lends itself to governmental control and more governmental control is definitely proposed by New Deal postwar planners. These planners are conscious of the fact, as is industry, that industry has only one customer—the government—and the planners want to perpetuate this unnatural relationship. The opinion of private economists here is that the Smaller War Plants Corp. will really have to "hump" if it is to coun-

## Equipment Gets 60% Of Expansion Funds

*Washington*

• • • WPB announced last week that about 60 per cent of the cost of government-financed industrial plant expansion this year will be used for machinery and equipment as compared with 45 per cent last year. The balance of expenditures is for construction. In 1943 the distribution of an estimated \$4,500,000,000 plant expansion program is expected to be \$2,700,000,000 for machinery and equipment and \$1,800,000,000 for construction. This compares with actual expenditures for government-financed industrial plant expansion last year of \$6,492,000,000, of which \$2,890,000,000 was for machinery and equipment and \$3,602,000,000 was for construction.

teract the effect of the business combinations now in operation.

A LOT of thought is being given to the possibility of putting symbol trains in operation for the transportation of steel to the West Coast. A symbol train is a freight train which has been time-scheduled. Ordin-

## THE BULL OF THE WOODS

BY J. R. WILLIAMS



nary freight trains are not on a time schedule and must give way to symbol trains and other fast freight. The WPB Steel Division seems to be backing this suggestion.

However, ODT and some railroad executives seem to be opposed to symbol trains for steel. They contend that if steel were given symbol trains, all sorts, manner and kinds of other materials producers would set up a clamor for faster delivery too. The result would be that all would be slowed down.

Another reason advanced by those who don't want the steel industry to go in for symbol trains is that steel companies seldom ship as much as 100 carloads to a single company destination. Railroad men say that shipments would have to be held up until a symbol train of at least 100 cars could be made up and this would mean delay.

## Maritime Commission Lets Contracts for 469 Vessels

*Washington*

• • • The Maritime Commission recently announced the award of contracts for 469 merchant ships, including 189 new design "Victory" ships, and 206 high speed tankers. The contracts were the first awarded for the Victory ships which will supplant the familiar Liberty ship as the principal emergency type in the Commission's program.

Yards and ships to be constructed under these new contracts are:

Marinship Corp., Sausalito, Cal., 36 tankers; Kaiser Co., Swan Island, Portland, Ore., 47 tankers; Kaiser Co., Vancouver, Wash., 48 tankers; California Shipbuilding Corp., Wilmington, Cal., 20 Liberty and 84 Victory; Oregon Shipbuilding Corp., Portland, Ore., 17 Liberty and 105 Victory; Sun Shipbuilding & Dry Dock Co., Chester, Pa., 75 tankers; Ingalls Shipbuilding Corp., Pascagoula, Miss., 10 C-3; and North Carolina Shipbuilding Co., Wilmington, N. C., 27 C-2.

## Canada to Make 140 Escort Ships; Shell Supply is Huge

*Toronto*

• • • C. D. Howe, minister of munitions and supply, in an interview stated that Canada's primary war need at this time is escort ships. Canada has about 500 escort ships in service and expects to turn out 140 this year, including corvettes, minesweepers and frigates.

In certain lines of munitions production, Canadian plants have furnished their full requirements and "we have seven months' production of shells in store now," Mr. Howe stated.

# "Switch" to STANDARDS

—and Keep MORE Carbide Jobs Running  
With LESS Reserve Stocks!

The planned use of standard styles of carbide tools and blanks, in place of made-to-order "specials", can bring these important benefits to your plant:

With standards you can meet your carbide tool demands more promptly.

With standards you can reduce your carbide tool inventory (and still maintain normal tool crib service—even with an increasing use of carbides).

With standards you can fill most emergency requirements usually the same day the need arises.

Here is the way to obtain the benefits of carbide tool standardization in your plant:



TAKE THESE THREE STEPS TOWARDS STANDARDIZATION



**1** Check your made-to-order carbide tools against standard carbide styles. You'll find that just 10 standard styles—used either "as is" or quickly adapted by grinding to special shapes—can be used for 50% to 75% of your jobs.

**2** Check your carbide tool stocks. With standards, you'll no longer need individual reserves for each of hundreds of special styles. Instead, you'll have a flexible master stock based upon not more than 10 standard styles.

**3** Check your carbide tools that MUST be "specials." Although the tool is special, the blank can often be standard. Keep a small master stock of those standards; braze them on your tools or cutters the same day the need arises. No "delivery" delays.

## CARBOLOY COMPANY, INC.

Sole makers of the Carboloy brand of cemented carbides

11153 E. 8 MILE BLVD., DETROIT, MICHIGAN

Birmingham, Ala. • Chicago • Cleveland • Los Angeles • Newark • Philadelphia • Pittsburgh • Seattle

Canadian Distributor: Canadian General Electric Co., Ltd., Toronto, Canada

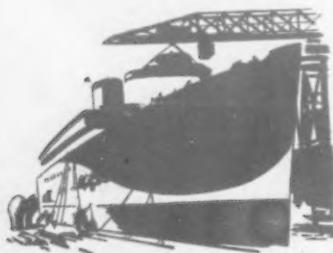
✓ Standard Catalog GT-142 on request.



# WEST COAST . . .

OSGOOD MURDOCK

• Present surplus of both pig and scrap may presage permanent situation . . . Loose-jointed group organization of small local plants proves more practical than elaborate pools.



**S**AN FRANCISCO—Although the West Coast has had a steel industry for many years, for the first time in history the Far West is using pig iron on a substantial scale, and, moreover, is making its acquaintance in an atmosphere of plenty.

Six months ago, the shortage of cast iron scrap was the most immediate and critical of any category. Today, cast scrap of most types is going begging, and is even being cast into ballast for Navy and merchant vessels.

The reason for this rapid transition from famine to feast lies principally in completion of blast furnace facilities at the Fontana plant of Kaiser Co., Inc., well in advance of the open hearth and finishing departments. Kaiser's 1200-ton stack was officially blown in just in time for dignitaries and spectators to adjourn comfortably to a slightly premature New Year's Eve celebration welcoming the year 1943, if they cared to do so. Quantity pig iron production was not immediately evident, but steadily the coast's first big blast furnace has worked its way up past 50 per cent of capacity and was hovering close to the two-thirds mark at last report. This sustained production, with no immediate home plant demand, not only has created a feeling of security among possible purchasers, but has even led to talk that a price floor rather than a price ceiling may be in vogue on pig iron before the season

is out. Such talk arises, not from any considered attempt by Kaiser to woo the coast foundry trade, but from home mathematicians of the two plus two variety, who conjecture that additional blast furnace capacity in the Provo, Utah, district may likewise be completed before raw steel and finishing facilities. Buyers who have been fascinated by the irresistible force versus immovable body conflict in prospect between Kaiser and Columbia Steel, U. S. subsidiary, reason that the fun might as well start now as after the war.

No basing point price has been established yet at Fontana, where the Kaiser mill basks in the sunshine among the orange groves, nor is the coast's big independent apparently anxious to have any figure fixed. Theoretically, both Kaiser and Columbia are offering pig iron for sale on the open market at the Provo price plus freight to the coast, which amounts to \$21.50 for basic and \$22 for No. 2 foundry at Provo plus about \$5.25 freight to the coast consuming points, or a total of \$26.75 and \$27.25, respectively. If OPA approves this Kaiser pricing practice, which seems to fit the general OPA theory of meeting the nearest competitor, and the market does not break from oversupply, Kaiser will be in a fair way to pay a tidy installment on his indebtedness to the RFC. If the same price reasoning eventually is carried into finished steel products with equal success, and the war is a long one, some day before the armistice the Kaiser family may be able to gather around the Fontana furnace, add the mortgage to the furnace charge, and shout "Hurrah, she's ours!" This point disposed of, postwar production costs would be primarily a matter of operating and sales expense, and Eastern competition would be stripped of its fangs of low cost raw materials plus low cost transportation around the Panama Canal. This is, of course, all dependent upon Kaiser being allowed to charge the same delivered prices as are charged for products of mills farther East plus all-rail freight. If listed Pacific Coast basing point prices for products coming in quantity from Eastern mills (which are based on water freight) are the Kaiser ceiling, the problem will be more difficult and drawn out, although not insurmountable.

OPA has been tackling the problem

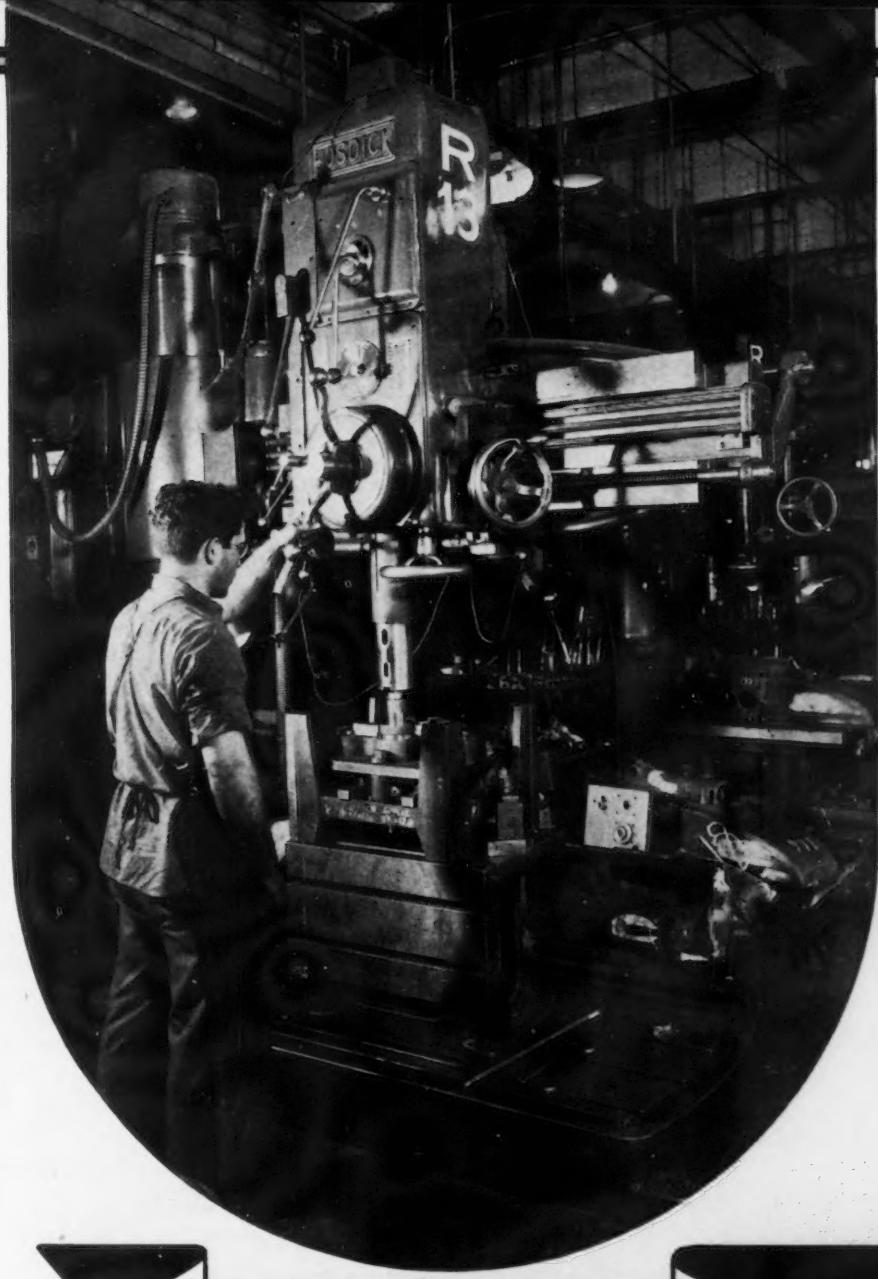
of a coast basing point for Kaiser pig iron, it is intimated. When that price is announced, and the method by which it is set is analyzed, a bellwether will have been nominated for all the finished steel prices in days to come.

**N**ATIVES familiar with the industrial structure hereabout had difficulty in associating recent glowing publicity in the popular periodical press on pools of small manufacturers in this area with what are generally considered to be the facts of the situation. Nevertheless, following resounding flops by several Chamber of Commerce inspired industrial pools of small town business which thought that production could be carried on with no other facilities than swish offices and no other manpower than attorneys and publicity men, a fair amount of success has been achieved by loose-jointed self starting groups operating in several California cities and towns. Organization charts of the successful groups are a far cry from those originally promoted by the old OPM, which thought that a "bits and pieces" program successful in the hand-labor British shops could be duplicated without modification in the specialized mass production plants fairly common even in the backwoods of American industry. This type of "we stand or fall together" organization, successful with the British, fell of its own weight wherever tried in this section of the country because of the paucity of available contracts which were suitable for division among all members of the organization, and also because the stronger members, upon receipt of a contract suitable to their facilities, usually deserted.

Typical of the sort of organization which has taken hold with apparent success in San Francisco Defense Works, Inc. Peacetime products of the present 24 members ranged from calculating machines to vegetable crates.\* Obviously, few contracts could be found for an organization running such a gamut if it insisted upon acting as a prime contractor and distributing sub-contracts to all of its members.

Therefore it was decided that a

\*The smallest concern has five employees and the largest 770. There are a total of 3000 employees in the group. One firm has 500, two have about 300 and one has 200. The rest are smaller.



## A Big Gun ON THE HOME FRONT

**FOSDICK**

Hydraulic

**RADIAL**

With production targets being raised constantly to provide ample equipment and materials for our various fighting fronts every machine tool must produce at full capacity—24 hours a day—7 days a week to maintain vital production.

The Fosdick Radial shown is typical of the hundreds of these machines at work in plants throughout the nation.

Here the machine is drilling and counterboring 4 holes 2.834 inch diameter—maintaining limits of

.0002 inch. Other operations include drilling and reaming one  $\frac{5}{8}$ " hole, drilling 6— $2\frac{9}{64}$ " holes, boring 6— $41\frac{1}{64}$ " holes, drill and ream 2—.498" holes, drill and tap 1— $3\frac{1}{8}$ " hole.

Thus this versatile, easy to operate machine is meeting constantly increased demands for production and accuracy on a wide range of operations for our "all out" war effort.

Investigate a Fosdick for your drilling, reaming, boring and similar operations. Complete information in Radial Bulletin R.A. Write for one.

**FOSDICK**

**MACHINE TOOL COMPANY**  
CINCINNATI . . . OHIO

## NEWS OF THE WEST COAST

large amount of leeway must be left for member firms to bid independently on contracts for which their facilities alone were individually suited. The group as a whole sometimes has taken prime contracts and divided them among its members. Sometimes one member acts as prime contractor and divides production among the others, and sometimes the group has acted as

tracts for which they are suited simply because they did not know of their opportunities, and who are unable to maintain a constant vigil over all possible sources of business, will appreciate the desirability of having someone on the job all the time to separate the grain from the chaff. Members assert that if the group has no other function, the maintenance of this com-

them satisfactorily, irrespective of whether the only alternative is concentration of contracts. The attitude of Smaller War Plants Corp. on that point has not yet been made clear in this area.

### New Step Taken on Quality Carbon Steel

• • • Because of the increased demand for high quality carbon steel to meet war requirements, special measures are being taken by the Steel Division of WPB to regulate production.

In the future, production directives will be segregated between regular carbon steel, quality carbon steel, and alloy steel.

The production directive committee of the Steel Division is exploring this problem with each individual producer and adjusting the production directives to meet the demands for the different grades of steel.

Quality carbon steel has been defined by the Steel Division as steel which is made in hot-topped molds, or if made in open-topped molds, is subject to special discard or receives special surface preparation at an intermediate form or in final form.

### Damage Suit Arises From Sale of Andrews Steel Co.

Newport, Ky.

• • • Recent sale of the Andrews Steel Co., Newport, Ky., to Norman B. Schreiber, Jerome S. Greenberg and Lehman Brothers of New York became the subject of a \$6,700,000 damage suit filed in the Federal District Court of Wilmington, Del., last week. The litigation was filed by MacDonald Brothers, Inc., Boston and New York industrial engineers. In the suit Mr. Schreiber was described as a former employee of the engineering firm, and Greenberg as Schreiber's attorney.

The allegations are that Mr. Schreiber was directed to obtain an option for the purchase of the stock of the Andrews company, but instead of buying the stock for MacDonald Brothers, by whom it is claimed he was employed, Schreiber and Greenberg bought the steel firm March 16 for themselves and Lehman Brothers, for \$4,925,282.

The bill further seeks injunction restraining the defendants from disposing of any of the stock and seeks to impress a constructive trust on the shares held by the two men.

**THEY "WALK THE PLANK":** These new shipyard gals "walk the plank." They walk many of them, and high ones. They climb ladders—and they've proved they have good sea legs at U. S. Steel's Federal shipyard, where they wield paint brushes and help fit insulation aboard destroyer escorts.



agent for certain members on sub-contracts. Contracts have been held for the various military procurement services as well as civilian war contractors.

Each plant operates independent-  
ly and is entirely responsible for its own management and material procurement. The interlocking link, and sole joint employee of the group, is Edward D. Schonberg, former employee of Friden Calculating Machine Co., the group's largest member. Friden's president, Carl M. Friden, is chairman of the board of directors of S.F.D.W. Schonberg's job is to keep up to the minute on all bid openings and contracts to be negotiated, and to pick out the ones suited to members of the group and make arrangements for handling them. Small manufacturers who have missed out on con-

tracting house alone justifies the organization.

Somewhat similar groups are operating at Sacramento, Stockton, Lodi, Fresno and Bakersfield, all in California.

Now that the idea has been pushed into the background that every back-yard shop, irrespective of its equipment or the ability of its owners, can be pressed into the war effort, some hope is being held out for these loose associations. Government bureaus or organizations established to bring salvation to small plants just because they are small are still regarded askance by the more efficient organizations. However, there now seems to be a general realization, with WPB officials in this area, at least, that it is useless to attempt to distribute contracts to firms or groups which lack the ability or the equipment to handle

# THIS NEW METAL IS A "NATURAL" FOR FIREWALLS

Stout resistance to heat and corrosion are two important reasons why ARMCO Aluminized Steel is being used for firewalls in many of America's new warplanes. Approved for this task, it is now undergoing tests in air-intake filters and other parts.

ARMCO Aluminized, a new specialty product of ARMCO research, is an aluminum-coated sheet steel. It has the surface qualities of aluminum and the strength of steel.

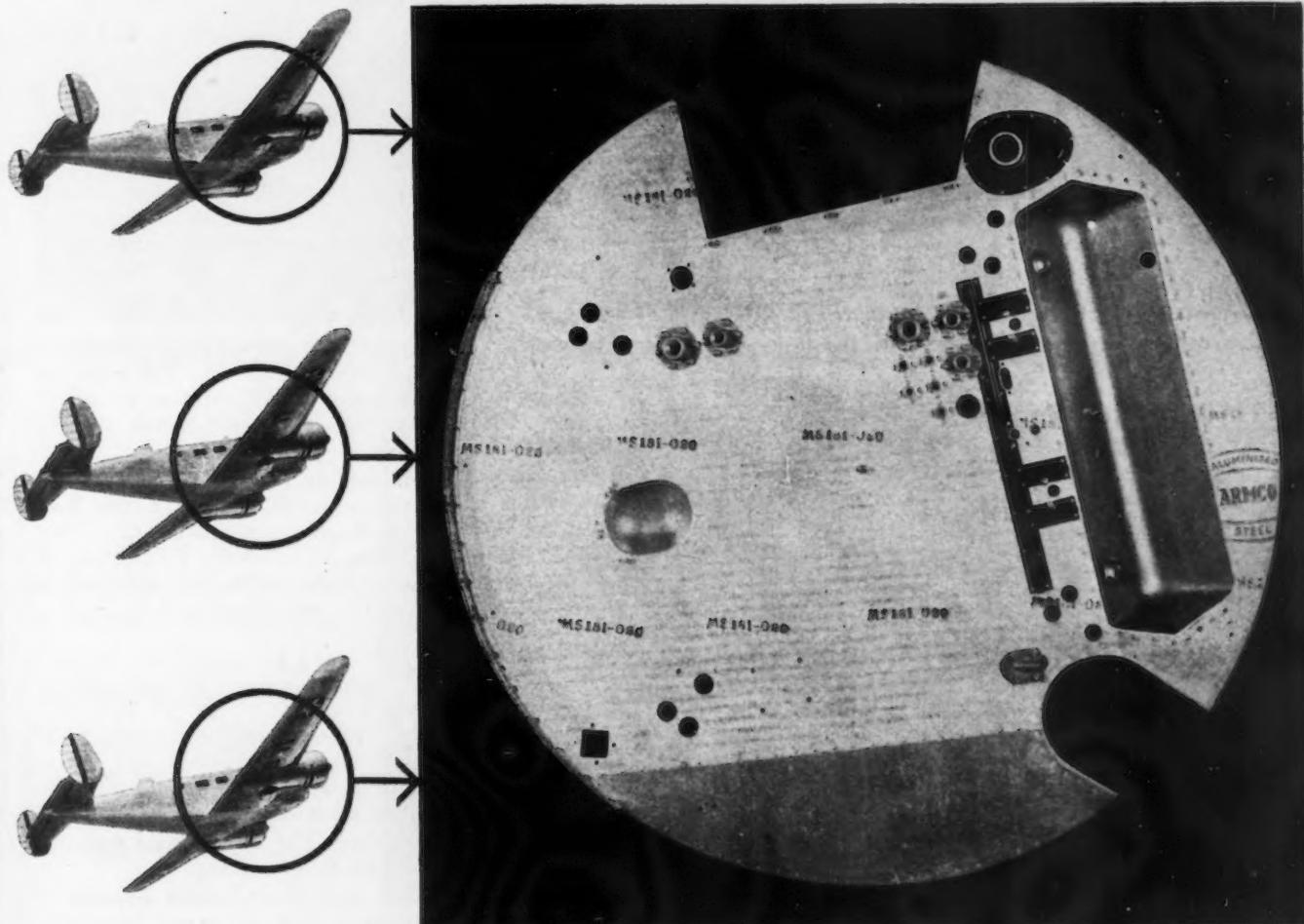
ARMCO Aluminized resists heat dis-

coloration up to 1000°F., and withstands severe oxidation at higher temperatures. Its corrosion resistance is due to the formation of a tight self-healing oxide film on the coating.

This coating clings firmly in moderate drawing and forming operations. ARMCO Aluminized is supplied in sheets or coils; gages are 14 to 28.

Designers of peace-time products will be interested in Aluminized for uses where resistance to heat and corrosion is important. After the war it will be supplied in a finish that can be buffed to a high luster.

For prices and complete data, write to The American Rolling Mill Co., 1401 Curtis St., Middletown, Ohio.



Beech Aircraft Corporation Photo

**THE AMERICAN ROLLING MILL COMPANY**

# Fatigue Cracks

BY A. H. DIX

## Scranton Ascendant

• • • The perverseness of the electorate in smiling on candidates on whom the Fourth Estate had lavished scowls that ran clear back to the wisdom teeth has dealt the power of the press repeated kicks in the posterior during the past ten years or so. We are therefore happy to be able to come forward with proof that the press is still mighty and shall prevail.

In its Mar. 25 issue your favorite family journal carried a news story entitled, "30,000 Unemployed and 7000 Empty Houses in Scranton, Neglected City." And now, exactly 42 days later, E. M. Elliott, who is Scranton's War Plant Industry Consultant, writes:

"The day after publication, both our Scranton and Washington Chamber of Commerce offices had no less than ten telephone calls each. 'Tell us about it,' they would say, 'we read The Iron Age story.'

The results so far during the past month: a bag factory, two metal-working plants, a clothing factory, and not lastly, but among others, the Murray Corp. of America is to build a 500,000 sq. ft. plant, to employ 7000 persons.

Scranton owes much to The Iron Age. Mar. 25, 1943 should go down in Scranton history as Iron Age Day, for that day marks the turning point in Scranton's history."

## With Glistening Eyes

• • • While unveiling our virtues to your admiring eyes, we would like to confess to an over-weaning pride in the NE steel wall chart you will find in this issue. We claim no credit for the idea of producing it. It was no bolt from the blue. As a matter of fact, for the past several months we have been wriggling uncomfortably whenever anyone said, looking at us meaningfully, "Now if someone would get out a chart that would show us at a glance what NE steel to use in place of an AISI or SAE number. . . ."

So, working up the chart was the obvious thing to do, but so many obvious things remain undone because of the amount of hard work involved that we are not ashamed to admit our frank admiration of the brains department's giant child. We are prepared to be deafened by the roar of cheers.

If you want extra copies at 25c each, Miss Mae Gatzenmeier, our cashier, who is already working overtime every night, will bless you if you will send in stamps or coin.

## Job for Madame Perkins

• • • Miss Selma Lenga, of your favorite family journal's Reader Service Dept., clipped this from the Questions and Answers column of a recent issue of *PM*:

INFORMATION ON BABIES: Please advise me where literature may be obtained on the care and education of an expectant mother.

—Mrs. Amedeo Sarno, Corona, L. I.

Write to the Dept. of Labor, Washington, D. C., for literature.

## Crackproof Signature

• • • Isn't this the ultimate?

—Nineteenth Reader

Yours for Victory,

J. L. Banks, Treasurer  
Quint Launching Volunteer Committee.

We tried foreshortening it by looking at it from the southwest toward the northeast, but find it is invulnerable from every direction. Mr. Banks has created a wondrous thing.

## One of Our Boys Made It

• • • A fat stripe for an ensign, a fat one and thin one for a lt. j.g., two fats for a lt., and so on up to an extra fat and three medium fats for an admiral. We always have to start from scratch when figuring naval ranks, and for that reason have been studying a naval uniform plan booklet we picked up in Macy's the other day.

We think that with a little more study we will be able to say, "Four stripes—there goes a captain." But we doubt whether we will ever be able to get the chief petty officer marks right. There are now 42 of them and new ones are being added constantly. Lyre for bandmaster, crossed pens for yeoman, axes rampant for carpenter's mate, crossed cannon for gunner's mate, and linked keys for chief commissary steward are easy. But do you know what an A in a diamond is? Probably not. He's an athlete. And W in a diamond stands for welfare.

The one that made our eyes pop like a hyperthyroid's is an I in a diamond. That, it says right here in Macy's catalogue, designates an "Int. Bus. Mach. Operator." This is the ultimate in recognition of a private business. International Business Machine's Tom Watson must be prouder of this than of all his other honors lumped together, and Remington Rand must be gnashing its gears.

## Tongue-Tripping Esses

• • • Maybe in the foregoing paragraph we should have put the apostrophe in "International Business Machine's" at the end instead of before the final ess, as IBM has more than one machine. But we are opposed to obvious plurals that slow up pronunciation, the classic instance of which is "materials handling equipment."

The additional ess is supposed to add cubits to the user's stature, like built-in heels. "Our Chicago offices are at . . ." sounds grander than "our Chicago office is at . . ." and would be much more impressive if not favored by companies that rent only desk space. Here in New York there is a "Butter and Eggs Merchants Association" — unless the typographically impeccable *New York Times* has sowed a wild oat. The extra ess on eggs makes articulation difficult without contributing to clarity; for everyone assumes a butter and egg man to have more than one egg.

The worst case confronting the Society for the Suppression of Unnecessary Esses occurs on the Jack Benny program. If such an expert enunciator as Don Wilson has trouble with "Grape-Nuts Flakes," think how many buyers are refusing to torture their tonsils and who say instead, "I'll take Wheaties."

## Stoppers

• • • Swenson went a thousand miles . . . to work for half an hour—*Pratt & Whitney*.

## Puzzles

• • • As you saw in an instant, doubling up last week's plants reduced the time to 29 days.

If you solve this correctly in a half-hour you can move your self-esteem up three notches:

A grocer attempts to weigh out identical amounts of sugar to two customers, but his scales are false. The first time he puts the weight in one pan and the sugar in the other, and the second time he reverses the procedure. Does he gain or lose?



Three Northern Cranes handle continuously the entire production of this foundry.

# Typical Installations of *Northern* **SUPER-CRANES**



Two of twelve heavy duty Northern Cranes in this plant.



High speed general handling crane in electrical manufacturing plant.

The proof of a machine is the service it gives. Northern Super-Cranes are giving excellent service in every type of industry. Users will assure you that these Cranes are not only outstanding in performance, but are economical in operating and maintenance costs, capable of handling extreme overloads, and continuously on the job. We'll send you a list of users if you ask.

**NORTHERN ENGINEERING WORKS**  
2607 Atwater Street Detroit, Michigan

# Dear Editor:

## CHROME PLATE HARDNESS

Sir:

We have urgent need for the following information: How can the hardness of chrome plate on steel plug gages be determined? What method and equipment is necessary? We require a definite hardness test that can be recorded and compared, such as Rockwell or Brinell or other testing methods. If a scratch test is to be made with some sort of device, what would the comparison of readings be with Rockwell?

J. M. CLARK

Jas. Clark,  
143 17th Ave.,  
Paterson, N. J.

• There is always a shadow zone in compiling industrial consumption statistics. Some statisticians swing the tonnage in that shadow zone one way and some another. Frequently the same study will not follow the same practice in all instances. In all our figures, every bit of steel traceable to the specific industry mentioned is shown as included in the tonnage consumed by that industry. For example, in the case of shipbuilding, the tonnage figures not only include hull steel but all machinery steel traceable to that industry.—Ed.

Tests made by United Chromium, Inc., reveal that all bright chromium deposits have a hardness equivalent to 1000 to 1025 Brinell. Hardness tests should be made on the base metal before plating, not on the chromium plate. The important test to make on chromium plate is a thickness test. Brinell or Rockwell tests are sometimes included in specifications for chromium plate, but they are more likely to indicate the hardness of the base metal than that of the chromium plate.—Ed.

## SHIPBUILDING STEEL

Sir:

I wonder if you can let us have something of the background of the table showing steel distribution by consuming industries, which appears on page 51 of your Annual issue (Jan. 7, 1943). My question relates to the quantities of steel going to the shipbuilding and construction industries. Your figures are as follows:

	Shipbuilding	Construction
1929	346,080	8,643,040
1937	390,880	6,037,920
1938	389,760	4,398,240
1939	517,771	6,100,286
1940	999,858	6,935,889
1941	2,929,237	10,221,167
1942	10,369,766	10,714,977

I have a feeling that the tonnage of steel shown for shipbuilding in 1942 is too high—much higher than we can verify on the basis of any reasonable figure for the unit quantity of steel required for the several types of naval and merchant vessels under construction in that year.

W. G. DONLEY,  
Head, Division of Research  
Federal Reserve Bank,  
San Francisco

• There is always a shadow zone in compiling industrial consumption statistics. Some statisticians swing the tonnage in that shadow zone one way and some another. Frequently the same study will not follow the same practice in all instances. In all our figures, every bit of steel traceable to the specific industry mentioned is shown as included in the tonnage consumed by that industry. For example, in the case of shipbuilding, the tonnage figures not only include hull steel but all machinery steel traceable to that industry.—Ed.

## SWISS TYPE AUTOMATICS

Sir:

Your Jan. 28 issue has a very instructive article by Frank J. Oliver on Swiss Type Automatics. This article refers to machines having been developed for the accurate milling of cams for automatics. Can you provide us with the names and addresses of the manufacturers of these machines?

F. JOHNS

Johns Machine & Tool Co.,  
484 McGill St.,  
Montreal

• The only one that we know of now on the market is a cam grinder for finishing flat cams that have been milled out previously. City Engineering Co., Dayton, Ohio, makes it. An excellent machine for milling cams is made by the original Petermann Co. in Switzerland, but as far as we know none is being built here as yet.—Ed.

## KUTANI

Sir:

We have some steel bars marked "Kutani Annealed." Could you give us some information concerning the manufacturer and analysis of this brand?

CHARLES ENDLER,

Manager

Congress Steel Co., Inc.,  
23-25 Purchase St.,  
Boston, Mass.

• None of our indexes, either foreign or domestic, shows this trade name. It is unknown to us. If any of our readers are familiar with this steel, will he be good enough to write direct to Mr. Endler.—Ed.

## CMP VIOLATION, MILD

Sir:

We are a small general machine shop doing industrial repair and maintenance work. We have an allotment of steel and brass under CMP-S-1 for our regular repair services. We have always sold small quantities of steel, cut from bar (not full bar), to farmers or occasional customers who need material to repair equipment.

For example, since the first of April, we have sold 8 ft. of 1-in. shafting to a customer who would install the shaft himself and a brass bushing bar to one of the packing plants which has its own shop to process it.

We would like a decision on whether

we are within our rights under CMP in so doing. We are not a warehouse or a distributor, but could we sell an occasional order like the above under MRO against our allotment? Are we to refuse a farmer or other customer who might need a small amount of material to maintain his operations?

IOWA MACHINE SHOP

• You are violating CMP regulations, yet even the WPB hesitates to say that you are not justified. You can replace the material, thus sold to date, with the AA-2X rating you have under CMP regulation No. 5. But this in itself constitutes a violation, as material obtained in this way is not for resale (see The Iron Age CMP Simplified CMP and Priorities Guide). On the other hand, CMP Reg. No. 3 would permit you to buy up to 10 per cent of your purchases of fabricated material for resale purposes. Again, the exact meaning of the order is infringed upon, as the material you buy is not in fabricated form. Without divulging your name, the WPB was asked for a ruling, which was that your motive of assistance to the farmers nearby more or less justified your action, despite the existence of a minor violation. Since in reality you are acting as a warehouse, it would be well to confine sales of this kind to a limit of \$10, a limit imposed on warehouses in similar cases by CMP regulation No. 4. It is also recommended that you put the problem before J. R. Stuart, Director of the WPB Warehouse Division, Railroad Retirement Bldg., Washington, to protect yourself against violation charges should investigators turn up sales of this type on your books.—Ed.

Sir:

A rough examination of your CMP and Priorities Guide, issued as a section of your April 29 issue, reveals that it contains the answers to questions that are constantly arising in the applications of CMP regulations.

Please forward five additional copies with invoice.

HARRY L. GRAYBILL,  
Priority Supervisor

York Safe and Lock Co.,  
York, Pa.

## BORON

Sir:

The Armory is desirous of receiving five copies of "Effect of Boron Containing Addition on NE Steel" by A. S. Jameson in your Mar. 25 issue.

E. Q. THOMPSON,  
Contracting & Purchasing Officer  
Springfield Armory,  
Springfield, Mass.

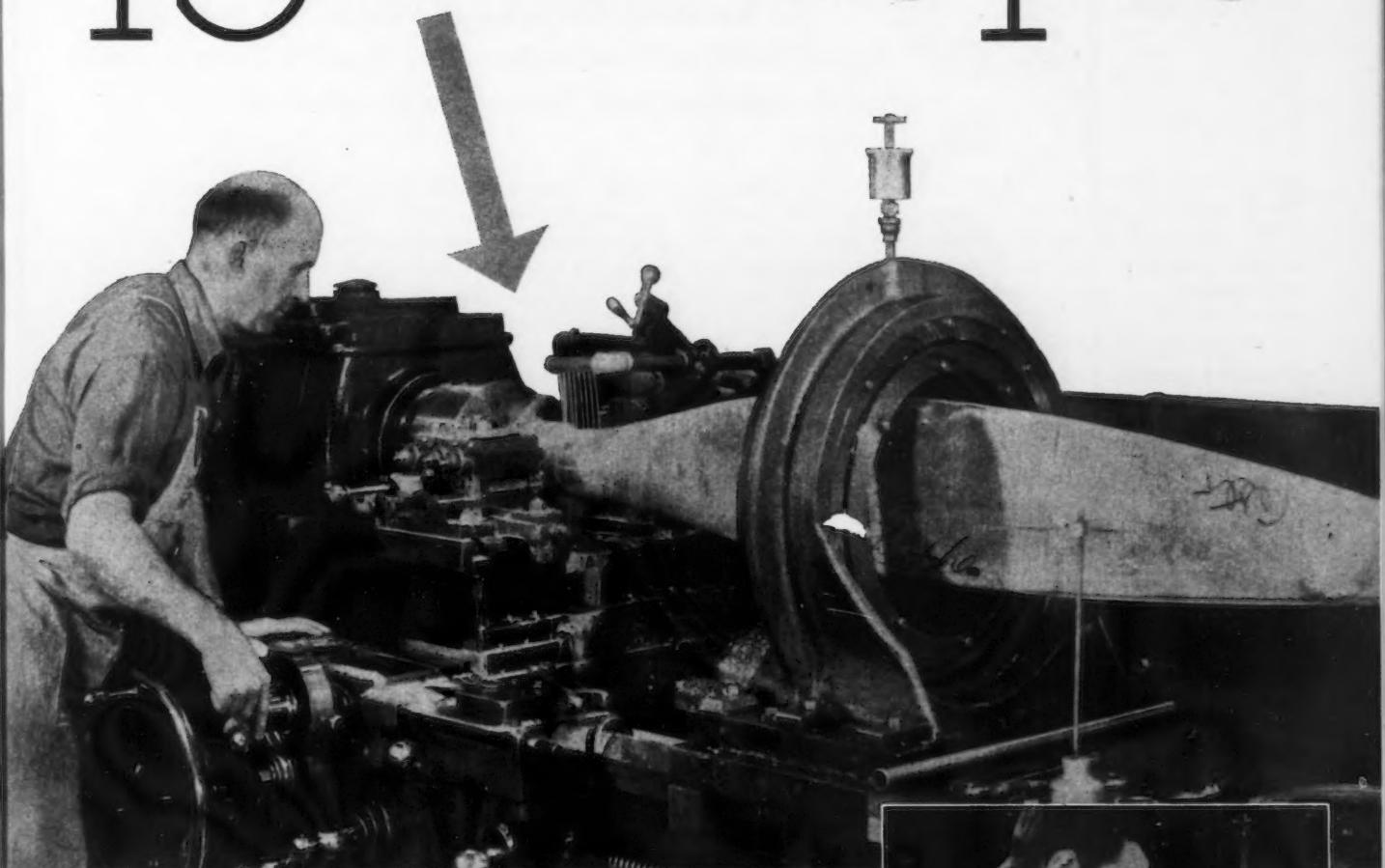
## CMP IN PUERTO RICO

Sir:

The Controlled Materials Plan is just being put into effect in Puerto Rico. I am, therefore, very much interested in securing your 16-page booklet, "How To Operate Under the Controlled Materials Plan."

CARMEN DIAZ  
U. S. Steel Export Co. (Puerto Rico), Inc.,  
San Juan, P. R.  
• Our latest booklet on CMP is the Simplified CMP and Priority Guide published as a separate section of the April 29 issue. A copy is being sent you.—Ed.

# 13 tools...but only 1 setup



Photographs by courtesy of Curtiss-Wright Corp., Propeller Division

Multiple tool setups are often complicated and expensive, and sometimes prohibitive, but in this case the value of careful job analysis has in practice proved to be productive, accurate and economical.

Requirements in slides, tool function and blade support (details omitted) all combine to the successful machining of propeller hubs, which includes straight turning, taper turning, grooving, etc.

Whether the work be small and delicate or large and rough, our engineers will be glad to work with you in determining efficient methods of machining.



Time is saved. This 12" Monarch is equipped with double-power angular feed, for machining both angles of a bevel gear, simultaneously.

**MONARCH**  **LATHES**  
COVER THE TURNING FIELD

THE MONARCH MACHINE TOOL COMPANY • SIDNEY, OHIO

# This Industrial Week . . .

- 48-Hr. Week Poses Problems in Steel
- Munitions Output Undergoing Adjustments
- Closer Control Near for Quality Carbon Steel
- Component Scheduling Plan Coming

**D**EVELOPMENTS affecting the steel and metal-working industries poured out of the hopper in rapid succession during the past week. Of all the numerous current developments those dealing with manpower have come to the fore most rapidly recently.

The trend in steel has been toward more hours per week per employee at many plants and now the entire industry is slated to go on the 48-hr. basis. The longer work week ordered by the government will not yield additional raw steel, as operations have been close to capacity for months. Down-grading of employees and layoffs appear likely, although part of the workers may be absorbed in plants nearing completion. In the neighborhood of \$100,000,000 will be added to steel company costs and some companies may be forced to appeal for higher selling costs, long unchanged.

Despite the short duration of the coal mine shutdown, the effects of it are expected to be felt in the steel industry for some time. Stockpiles before the strike had been reduced and if negotiations fail after the 15-day Lewis truce, it is almost certain that some blast furnaces will go out of commission immediately. Last week's shutdown of captive mines which in some cases amounted to four days and the loss of two to three days' production of beehive coke were serious threats to the steel industry.

**M**EANWHILE, evidence continues to accumulate that munitions making programs are undergoing adjustments, with output by some sections of industry being curtailed. Whether these adjustments merely are temporary only time will tell, but according to an Ordnance officer who addressed foundrymen of the nation at St. Louis last week more than 90 per cent of prime contractors holding Army Ordnance contracts have been affected by cut-backs. At the same time, he stressed that shortages still exist in aircraft and ship production, an opinion which jibes with other statements by Washington authorities last week who indicated that it still seems unlikely metals will be released for other-than-war purposes. The railroads are scheduled to suffer a

blow on their third quarter requirements for steel, and the oil industry also may not receive the steel it wants unless adjustments are made by all interested parties.

On direct war production, latest reports show 6200 planes were made in March. Munitions output was about even with February on the daily basis. In first quarter of 1943 the U. S. produced about 18,000 artillery pieces, 235,000 machine guns and 1,000,000 rifles and sub-machine guns. The Maritime Commission reported that 157 merchant craft were delivered in April and that five launchings a day now represent the routine.

In order to help straighten out the confusion and lack of coordination in regard to components, WPB is considering the establishment of a new industrial procedure soon. Forced by the issuance of Order M-293 on components, the new plan will flow components and sub-components by establishing a relationship between orders for them and the program for which they are intended. Requirements will be established for these items through the use of a new form and capacity for their production will be adjusted with the requirements. Components will be flowed to such programs as the highly critical 100-octane gasoline, synthetic rubber, aluminum, magnesium, steel, shipbuilding and power generating plant projects. The plan will be known as the Component Scheduling Plan.

**H**IGH quality carbon steels of forging and special requirements grades may be subject soon to scheduling similar to that employed by WPB with respect to alloy steels, it was learned at Washington this week. Also, steel producers are going to be requested to increase capacity for making these steels because demand is more for high carbon and special requirement steels than for ordinary grades.

The reason for scheduling these types of steel is that the alloy steel program has been advanced at the expense of these grades. Also, it was disclosed, no exact requirements are known and these figures must be arrived at before capacity can be intelligently increased.

The WPB Steel Division is now engaged in a facility survey to determine what increases in capacity can be made without extensive monetary outlays and quickly enough to satisfy demand. One steel division official said that although the Steel Division has rather complete information on alloy steel requirements and how facilities are balanced with demand, it does not have complete information on high quality carbon steel.

Steel mill schedules for third quarter are reported filling up at a fast rate under the "first come, first served" policy which now prevails under CMP. As

## News Highlights in This Issue

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a matter of fact, even a generous quantity of orders for delivery in first quarter of 1944 are held by the steel industry.

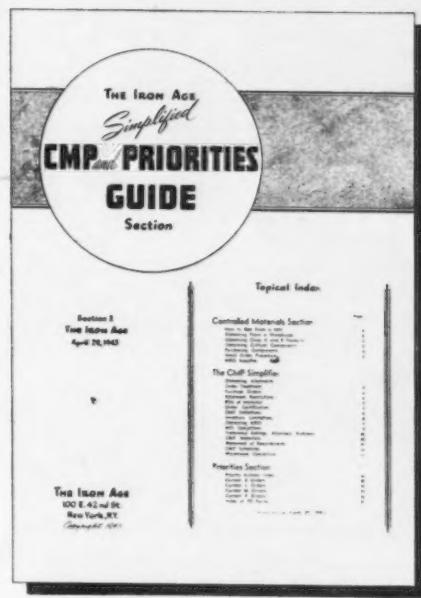
SOME manufacturing firms under CMP still are not sure just how far they are likely to be curtailed in their second quarter operations due to difficulties of obtaining materials for the near term under CMP. Some allocations have not trickled down yet from primary to sub-consumers and at the same time many steel users are losing their positions on mill books because of slowness in passing on their allotment numbers.

Some steel executives believe that order backlogs held by mills are about 60 per cent authenticated with CMP allotment numbers. It is understood that WPB informally has ruled that when an older backlog order is changed in size or specification, so that the mill schedule would be interfered with, a new order must be entered to cover the material.

The question of what is a buyer's financial liability for steel ordered but cancelled before delivery, due, for instance, to the ending of the war, has been the subject of much quiet consideration by steel company legal staffs. Probably steel producers and steel consumers alike will be forced to take a reasonable attitude on the matter. Steel products which mills usually buy and products which they normally sell in peacetime, probably will be given every possible consideration.

STEEL ingot production this week dropped two points to 98.0 per cent of rated capacity from 99.5 per cent, the lowest level since the week of Sept. 24, 1942. Pittsburgh output declined one point to 101.5 per cent while operations in the Cleveland district fell seven points to 89 per cent. Buffalo is down two to 104.5 per cent and Detroit steel production is 2.5 points less than last week's rate of 107 per cent

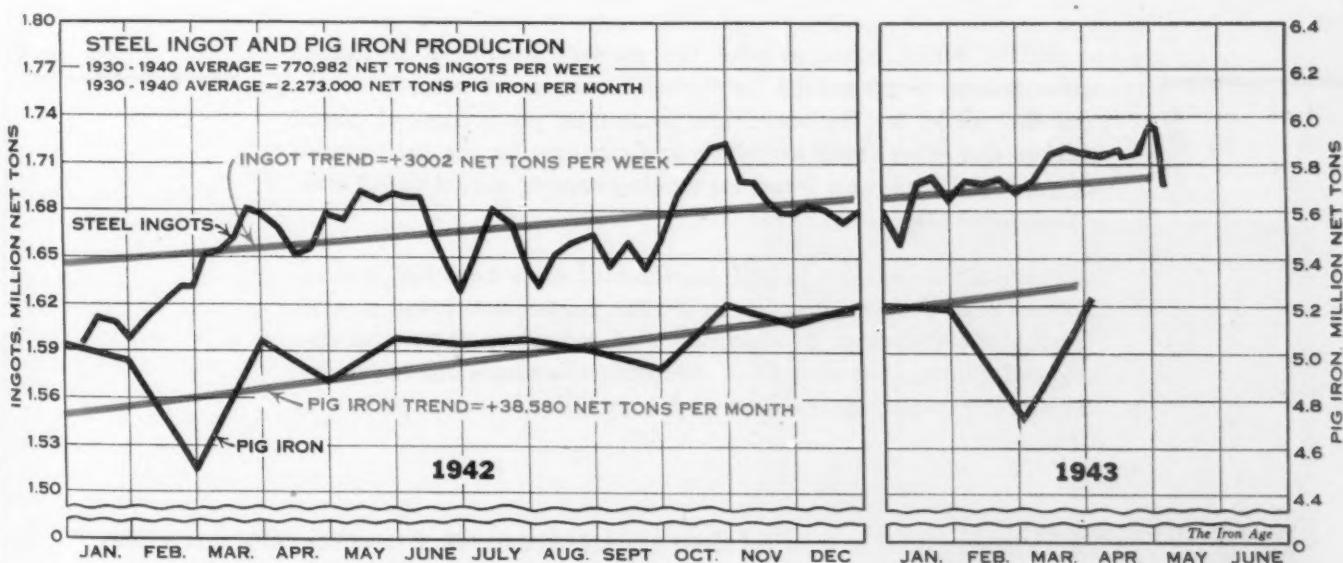
## New, Simplified CMP-Priorities Guide "Tells All" in Brief Form



• • • Last week we featured a simplified CMP and Priorities Guide. Contents include: Priorities Section; Priority Actions, Current E, L, M, and P Orders, Index of PD Forms.

Reprints still are available. Up to 10 copies are 25c. each; over 10 to 25 copies, 20c. each; more than 25 copies, 18c. each. With orders for less than \$1 send stamps or coin. Address: THE IRON AGE, Reader's Service Dept., 100 East 42nd St., New York.

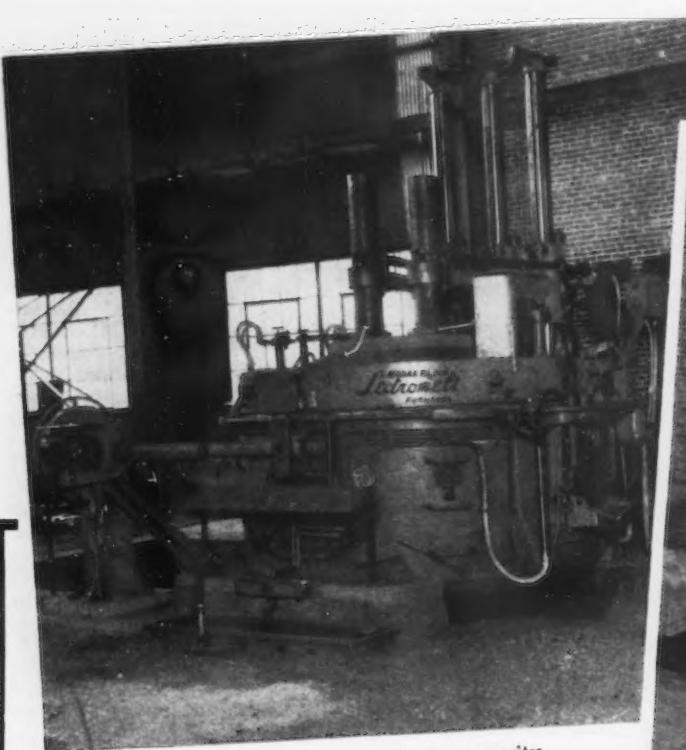
or 104.5 per cent. Steelmaking in St. Louis has sagged seven points to 99.5 per cent and in the Eastern area it has decreased one and a half points to 90.5 per cent. The only gains in output occurred in the Wheeling district which is operating at 90 per cent of capacity, two points higher than last week, and Cincinnati which is operating at 109 per cent, four points higher. Chicago at 99 per cent and Philadelphia at 96 per cent are unchanged from last week.



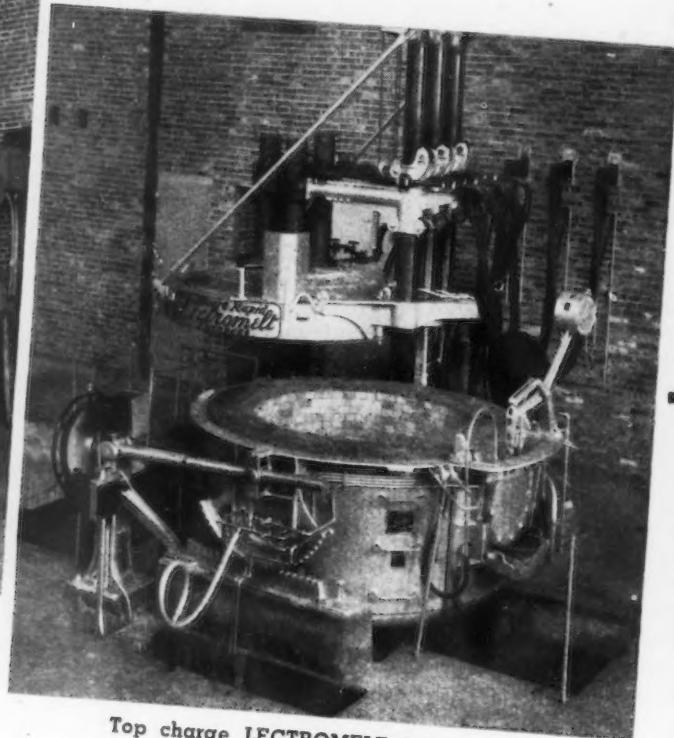
Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	S. Ohio River	St. Louis	East	Aggregate
April 29	102.5	99.0	94.0*	96.0	96.0*	106.5	88.0	102.0	107.0	102.0	105.0	106.5	92.0	99.5
May 6	101.5	99.0	94.0	96.0	89.0	104.5	90.0	102.0	104.5	102.0	109.0	99.5	90.5	98.0

\* Revised



Size "OPT" 4½ tons per hour capacity  
LECTROMELT top charge type furnace  
in normal operating position.



Top charge LECTROMELT furnace with  
roof raised and rotated to one side for  
quick charging by a drop bottom charge  
bucket.

# Modern STEEL MELTING

LECTROMELT furnaces offer the modern means of handling your melting requirements. Lectromelt furnaces are used throughout the world for the rapid and economic production of plain carbon and alloy steels for ingots and castings; for the production of gray and malleable irons; for melting copper, monel metal and other products.

The top charge type is built in standard sizes from 100 tons to 250 pounds. Their use results in greater production, lower power consumption, savings in electrode and refractory costs, and increased tonnage per man hour. Lectromelt furnaces are ruggedly built for maximum production and long life. Write for complete details.

MOORE RAPID  
**Lectromelt**  
FURNACES

Pittsburgh Lectromelt Furnace Corporation  
Pittsburgh, Pennsylvania

**The Furnace of Today and Tomorrow**

# 48-Hr. Week in Steel Effective July 1; Move by WMC Arouses Many Questions

• • • Effective July 1, the steel industry which employed 635,000 persons in February and paid them \$122,759,000, is scheduled to go on a 48-hr. week, according to a ruling May 1 by the War Manpower Commission. The added cost to the steel industry is estimated at around \$100,000,000.

The move immediately aroused the question as to whether steel producers might not be forced to ask for higher selling prices. There was speculation over the possibility that the WMC ruling might be an attempt to forestall eventual union demands for more pay.

One certainty is that no more raw steel can be produced under a 48-hr. week than at present, for ingot production has been at full capacity recently. Steel executives have said repeatedly that the industry was paying overtime wherever necessary.

The War Manpower Commission stated that the average week in the steel industry has been 41.5 hours recently with some units operating only 37 hours. As pointed out below, these figures are apt to be misleading.

Steel mills working less than 48 hr. may hire no new workers after June 1 without WMC approval for the specific job.

## Demotions and Lay-Offs Predicted

### Pittsburgh

• • • The War Manpower Commission's ruling placing the steel industry on a 48-hr. week effective July 1 comes at a time when the industry was already in the process of going over to this setup voluntarily as conditions made it possible. A part of the job already is done.

Whether the two months given by WMC to enable technical factors to be worked out will be sufficient time to prevent down-grading of workers and layoffs remains to be seen. Opinions gathered by THE IRON AGE last week disclosed that an arbitrary and sudden imposition of the 48-hr. week would have meant the downgrading of workmen and the enforced laying off of thousands more.

A more realistic interpretation of statistics on the average work week will have to be taken. Present figures on the average number of hours worked have been influenced by the average employee figure. The latter has been diluted by absenteeism and high turnover. For instance a man may have quit early in the month and another hired later in the month. Both of these would be included in the average number of employees for the month. Corrections will have to be made to determine the average number of hours worked by those who have put in a full week and are still on the payrolls.

The industry will have difficult problems going to the 48-hr. week in some vocations. It will be impossible in those where the amount of steel to be finished on directives of the WPB is insufficient to provide 48-hr. a week

for the crews. In other cases where continuous jobs such as open hearth and blast furnace go to the longer week (many have already reached the longer week) it may be necessary to reduce a man's grade in order to give him time.

With steel output already at maximum heights, it has been learned that in some areas where the 48-hr. mandatory ruling has been imposed, some workmen have been down-graded or reduced in vocational level in order to fully comply with the WMC ruling. The head of one company has told THE IRON AGE that an imposition of a 48-hr. ruling in the steel industry before conditions would have been voluntarily worked out would have affected as many as 1500 employees either by downgrading or by actual dismissal.

Practically all steel companies covered in the survey have indicated that a large proportion of their forces were already on a 48-hr. week or longer.

Statistics on the average work week in the steel industry, it is claimed are misleading because of absenteeism and turn-over. At one plant, payroll records on an average basis indicate 42.3 hours a week per man, but after adjustments have been made for absenteeism and turn-over, it is indicated that those actually working put in 45.3 hours a week. In another plant employing close to 3,000 workmen the statistical average showed 40.1 hours a week but on an adjusted basis, those working put in an average of 46.5 hours a week.

Some companies whose average work week per employee was less than 48 hours were found to have as many as 43 per cent of the force on a six-day basis or more, which if corrected for absenteeism and turnover would probably run close to 50 per cent.

Some labor observers here point out that the main reason for an extension of the 48-hr. week is either to increase production or to release men for the armed forces or other war work. It is argued that steel production is already at its peak with existing facilities, the army is taking anyone it wants and the supply of war workers for other jobs might be statistical rather than practical in view of the differences in vocations. Another factor is that workers are automatically leaving jobs to go to other war work where 50 to 55 hours a week are offered.

**AMERICAN CYCLONE LICKS ENEMY BULLET:** A Wright Cyclone engine exhaust valve which operated 110 hr. after an enemy bullet drilled a hole in the valve stem is examined by Myron B. Gordon, vice-president of Wright Aeronautical Corp. The engine was installed in a Curtiss (75-A) Mohawk fighter operated by a British flying unit in the Orient.



## Coal Strike Could Reduce Steel 20% in Few Days; 100% in 2-3 Weeks

### New York

• • • The steel industry is confronted with a complete shutdown inside of two or three weeks after the actual stoppage of coal shipments and a partial shutdown within a few days if mediation does not actually put the miners back in the pits. Last reports indicate that despite John L. Lewis's order for the miners to return to their jobs, they were only straggling back and that most mines hit by the walkout on April 30 midnight were operating at a greatly reduced rate.

Coal and coke stocks at steel plants were reported at from 2 to 10 weeks' supply but are believed to average throughout the industry at about 10 to 14 days' supply. Even though the truce sends the men back to the mines the slowdown is expected to partially consume the mills' stockpiles and it is believed this amount will not again be replaceable for the duration thus putting the industry in an increasingly vulnerable position. Some plants report that in the first week of a coal strike up to 20 per cent of pig iron production would be taken off—a pig iron loss which would double itself in steel loss.

The coal industry is now several days into the 15-day anti-strike truce announced by Lewis one-half hour before President Roosevelt went on the air Sunday night with a special plea to miners. About 530,000 miners were instructed to return to the pits by Lewis, on the terms of the old agreement with operators, for 15 days pend-

ing further negotiations thus extending the bituminous miners' agreement to a total of 45 days and the anthracite miners' by 15 days.

Negotiations will now be between the UMW and the government which is now the "new employer" of the miners following the taking over of the mines by the government on May 1. The new contracts are to be retroactive to the expiration dates of the old agreements which is April 1 for the bituminous miners and May 1 for the anthracite miners.

It has been reported that the new agreements might be concluded on the basis of a guaranteed six-day work-week for the duration of the contracts signed between the government and the UMW. The contract probably would be for one year and would add \$2.25 a day to the earnings of 450,000 bituminous miners. A similar agreement seemed imminent in the anthracite industry although the pay scale would be somewhat different as present scales are \$7 a day for the bituminous industry while only \$5.08 for the anthracite miners. The guaranteed

six-day week had already been accepted by the miners when offered during the soft coal negotiations by John R. Steelman, government conciliator, but had been rejected by the operators. The government now being the boss, the six-day agreement is seen being rushed to conclusion.

Nearly all operators experienced some drop in operations during the week or week-end. Irving S. Olds, chairman of the board of U. S. Steel Corp. stated before the annual stockholder's meeting Monday that all of the corporations principal mines were down Saturday and that stocks of coal and coke would only permit operations for 10 to 14 days.

Citing statistics, Mr. Olds stated that the corporation's 22,000 miners were averaging 38.5-hr. per week at an average earning of \$47.66 a week during March. These weekly earnings, he said, compare with \$28.56 in January of 1941; \$31.89 for the year of 1941 and \$37.03 for the year of 1942. In other words, average weekly earnings in March were approximately 67 per cent higher than in January, 1941; approximately 50 per cent higher than weekly earnings for the year 1941 and approximately 29 per cent higher than the weekly average for 1942.

## Steel to Suffer, Even with Truce

### Pittsburgh

• • • Despite the short duration of the mine shutdown, the effects of it are expected to be felt in the steel industry for some time. Stockpiles before the strike had been reduced and in some cases mechanical diffi-

culties were being encountered in transferring the coal. The shutdown of captive mines which in some cases amounted to four days has further complicated the job of building stockpiles back up at some steel company plants.

More serious has been the loss of two to three days' production of beehive coke. Coke workers went out last Friday night and while some returned Monday this week others did not show up until Tuesday. Before the strike beehive coke supplies had been quite tight and the loss in production while not closing down any blast furnaces in this district has nevertheless created a more serious position for beehive coke for blast furnace use.

If the present truce and government operations of the mines fails to bring an agreement on the mine question the steel industry will again be faced with the possibility of curtailment in steel output.

Some sources believe that the maneuvers in the past few days represent "face-saving" tactics for Lewis and the Administration.

### — THE GREAT TRAINER —



## NEWS OF INDUSTRY

**Quick Facts on the Coal Situation****Coal Requirements**

• • • Coal requirements for 1943 are 600,000,000 tons of bituminous and 65,000,000 tons of anthracite. Soft coal mining must produce 12,000,000 tons per week to meet this demand. Anthracite mining must average 1,250,000 tons per week.

Iron and steel estimates a need for an additional 12,000,000 tons of soft coal this year.

(Department of Interior estimates.)

**Coal Strike in a Nutshell**

• • • About 530,000 miners are affected by the coal strike (and now strike truce)—450,000 in bituminous mines; 80,000 in anthracite.

Official strike began at 12:01 a. m., May 1.

Truce effective 12:01 a. m., May 3.

The strike was caused by expiration of the 30-day extension of the bituminous miners' agreement with operators and the expiration of the regular anthracite agreement.

Issue at stake was a \$2 a day pay increase, portal-to-portal pay and related benefits.

Claims were: Increased cost of living by the miners; violation of the

"Little Steel" wage formula by the operators.

**Miners' Wages**

• • • Hourly earnings in bituminous mines in January were 22 per cent higher than in August, 1939.

Actual "take-home" pay, due to full time work, was 53 per cent higher in January than in August, 1939.

Miners' cost of living rose 22 per cent in the same period wages rose 53 per cent.

(Excerpted from OPA Administrator, Prentiss M. Brown's statement.)

**Government and Union Moves**

• • • Coordinator of Solid Fuels takes over all producing mines in the name of the Government May 1 as directed by President Roosevelt.

John L. Lewis, president, UMW, proclaimed a 15-day strike moratorium and ordered all miners back to the pits on the terms of the old agreement pending negotiations with the "new operator," the government on May 2.

Between 250 and 300 OPA legal investigators have been instructed to investigate the cost-of-living in mining areas.

(OWI.)

tions and are making out better from a wage and working conditions standpoint than they could in the mills. In other cases, it appears that the statistics on the availability of negro labor do not represent actual conditions.

Carnegie-Illinois will need approximately 5000 workers when the Homestead project is completed, but fortunately will not need this many in the beginning. It is understood that the company is exploiting to the greatest extent the possibility of using female workers and is exhausting its ex-employee files. Skilled workers will be recruited from other Carnegie plants and supervisory training programs have progressed to such a point where no serious supervisory problem is anticipated. Despite all these measures, it may be necessary for the steel company to go outside of the Pittsburgh area and recruit labor which might necessitate the setting up of emergency housing facilities here.

The critical manpower situation and the experience of the Carnegie-Illinois company represents the problem now being faced by most every company which is beginning, or will soon begin, operations a newly expanded plant.

By-products of this serious manpower situation have been the spreading thin of skilled and supervisory workers at locations where it has been necessary to recruit workers for new plants. It has not been a question of overall availability of labor, but the trouble has been with the availability of the type of labor needed to fill the necessary jobs.

**Where to Find Workers for Plants Nearing Completion Is Latest Complexity****Pittsburgh**

• • • Having survived some of the bottleneck and material hurdles which have put many steel expansions from three to six months behind schedule, the most serious problem now faced by those in charge of these projects is the manpower situation. Despite statistical data indicating availability of workers, actual conditions in some centers where steel companies frantically are attempting to build up needed forces, are far from rosy.

For instance, there is the attempt of Carnegie-Illinois Steel Corp. to recruit sufficient manpower to anticipate a partial opening by June 1 of the Homestead steel expansion project. This new steel plant includes blast furnaces, open hearths, blooming mill and plate rolling capacity. Originally scheduled to be completed before this time, it is expected now that the company during the latter part of May will be able to put into operation two or three open hearth furnaces and other equipment. The balance, it is believed, will be installed throughout the remainder of the year, with the final furnace in use

some time early in 1944. Blast furnaces (two) may be blown in by July or August. This holdup has been explained previously in THE IRON AGE and has as its roots the now defunct priority system.

While the company has not commented officially, THE IRON AGE has learned that efforts to obtain workmen for the Homestead project from the United States Employment Service offices here have been almost fruitless. Already overburdened in an attempt to supply its existing plants with new manpower because of the draft and high labor turnover, the company's own employment offices have been attempting for months to gather together a nucleus required for the initial opening of the new Homestead steel plant. Despite the figures indicating the availability of negro labor, the company has been unable to interest or obtain anywhere near the number of such workers that it could conveniently use. It is understood that many negro workers have been able to obtain war jobs requiring from 50 to 55 hr. a week. Others, it is said, are in non-essential occupa-

**Peace-Time to War-Time Changeover Proves Successful****Dayton**

• • • One of the latest miracles of peace-time to war-time transformation concerns the Stanley Mfg. Co., Dayton, Ohio, an art publishing firm. Several executives of the firm, attending a meeting of the War Production association, got their idea for the changeover after hearing a speaker relate how important the cutting tool industry is. Over a period of seven months the company sent its employees to school to learn the intricacies of lathes, mills, reamers, broachers and other machines used in the tool industry; secured a man capable of handling tool production, and secured the necessary machines to run the tool business. Today the company is contributing greatly to the war effort.

## Cancellation Of War Contracts for Steel Is Subject of Much Consideration

### Chicago

• • • The question of what is a buyer's financial liability for steel ordered but cancelled before delivery, due, for instance, to the ending of the war and the ensuing cancellation of war contracts, has been the subject of much quiet consideration by steel company legal staffs over the past few months.

The question originally arose when steel buyers began attaching conditions of sale to their orders which completely absolved them from any liability should they cancel the order due to their own war contracts being cancelled.

Steel mills, foreseeing that they might be left with large tonnages of special sizes and shapes on their hands in such a case, refused to accept such conditions and countered with their own conditions of sale.

After considerable study of the problem, the legal staffs of the mills appear to have evolved a set of conditions which have become fairly general throughout the industry, except for minor modifications in some cases to fit specific conditions existing at individual mills.

Generally speaking, mills are requiring that the buyer assume a degree of liability for the steel after the steel for a given order has left the open hearth. In most cases, this liability is specified to be the value of the steel in the form which it is in when the cancellation is received. In other words, if the steel has reached the ingot stage, the buyer's liability is the price of the steel ingots. If the steel is in billet form, then the liability is the value of the billet. In some cases it is stated that the buyer's liability will be negotiated on the basis of the value of the material when the cancellation is received.

Some alloy steel producers are stipulating that the buyer's liability begins as soon as the required raw material has been purchased. This clause is designed to protect them in the event it is necessary to purchase special alloying elements.

When special shapes or sizes are ordered, the buyer usually is assessed with the responsibility of either paying the finished price for the material, including the cost of the rolls, etc., or of finding a new buyer. When special rolls are turned up, the buyer

is to be charged with the cost of the rolls, even though no steel has been rolled on them.

The chief conflict between steel buyers and the mills at present appears to be the efforts of the buyers to have the mills assume responsibil-

ity for delivery dates, which obviously cannot be done under CMP.

A clause appearing in several purchase orders recently specifies that in the event the steel is not delivered on a specific date, the buyer may purchase an equivalent amount of steel from a warehouse and charge the mill with the difference between the warehouse price and the mill price. This clause, of course, is not being accepted by the mills.

## Pittsburgh Sees Usual Practices Prevailing

### Pittsburgh

• • • Speculation on the disposition of steel war contracts after the conflict ends has not reached any heights here since practically all government commitments include termination clauses or cancellation provisions which provide for a settlement on material in the process of manufacture, but not delivered.

Steel products ordered, but not produced, on a government contract will, on the termination of hostilities, be dropped off the books. This situation is identical to the case of straight commercial orders which constitute

backlogs and which have a habit of disappearing overnight when a boom collapses, or when no further use is seen for the material involved.

The theory that steel contracts or commitments work both ways is no more than a theory. It is hardly possible that steel companies would argue with their customers over taking shipments, the use for which no longer exists. This does not mean, according to observers here, that the steel industry would go to pieces after the war. It might mean, however, that specific backlogs of certain products would be wiped out.

## Reasonable Attitude Predicted

### New York

• • • One astute steel industry executive when questioned on the subject of cancellations of contracts, expressed the opinion this week that steel producers and steel consumers alike will be forced to take a reasonable attitude on the matter. This is because the larger war producing companies are also the larger makers of peace time products.

The consensus here is that on steel products which steel mills usually buy and on products which they normally sell in peace time, steel mills will assume a large share of responsibility or at least take a liberal attitude when the time for contract cancellations arrives. In the category of low carbon steel products, no serious problems will arise as mills can dispose of this material fairly readily. High carbon steels, depending upon the mill affected, probably will not present a problem if the steel is in the form of ingots or billets. Serious problems are expected in some of the medium carbon steels, the category which includes shell steel.

One steel company contends that

the consumer is liable upon cancelling an order if at that time the material is in the form ordered by the consumer or processed so far that it cannot be used for any other purpose.

It is said that at present the Army, Navy and Maritime Commission have separate termination clauses and that the Procurement Appeals Division of WPB at Washington is now trying to develop a standard procurement clause.

Purchasing agents contend that the clauses now being passed to steel mills are the same as those which the government is enforcing upon its prime contractors.

## Proposed Standard Clause May Be Issued in Early Summer

### Washington

• • • The proposed standard cancellation clause has been submitted to trade associations and companies which have evidenced interest in it, for their comment and suggestions. The return date for the letter is about May 5 and several weeks later the clause is expected to be issued.

## Realistic Approach to Oil Needs Possible; Steel Industry on Sidelines

### Pittsburgh

• • • At the rate steel mills are allowed by WPB to produce oil country goods, it is doubtful if oil company requirements through the balance of this year can be met. The setup at present for the second quarter through the fourth quarter indicates slightly more than 700,000 tons of steel for the oil industry.

At the rate tube mills now are operating on oil country goods quotas, probably not more than 50 per cent of these requirements could be met. Within the past few weeks, however, it has been learned that the bomb program has been reduced, which may free both steel and rolling capacity for oil country goods.

Both the oil industry and the steel industry seem to be bystanders in the present oil "muddle," while the WPB, the OPA and the PAW exchange blows. The WPB is said to be willing to approve steel requirements when and if the PAW makes up its mind what the oil industry needs. It has been said that steel mills will be allowed in the aggregate to build up 20,000 tons inventory of oil country goods for the use of the smaller oil producers when the PAW decides what sizes are needed. The WPB also claims that they are ready and willing to establish several depots throughout the country and allow them to be stocked with oil country goods for the use of the smaller companies which are not in as good a position to anticipate requirements as the larger oil companies.

While the steel-for-the-oil-industry controversy goes forward, wildcatters still have not been convinced realistically that upon them rests some of the future oil reserve discoveries for the country. Oil veterans claim that if the OPA were to relax its policies on the price of crude oil, this alone would serve to put renewed life into wildcat drillers, who today, it is said, see nothing but a bad gamble in time and money to continue their age-old practices.

On the other hand, the PAW has come in for some criticism from the larger oil companies because many time steel requirements have been set up on the basis of so many wells with the PAW approving hardly more than half this many drillings. Recently it is argued that this situation has been cleared up to some extent.

On the face of the situation, it appears that if the oil industry is not supplied with 700,000 tons of steel during the last three-quarters of this year, the oil problem will become exceedingly serious. However, an analysis of the 16,000 contemplated wells this year indicates that steel probably will be needed for no more than 13,250. Of the 16,000 wells, 4500 are supposed to be wildcat drillings. According to reliable authorities, this means approximately a return of 750 wells completed out of the 4500 wildcat drillings. This would leave approximately 13,250 actually completed wells for this year, which on the basis of 50 tons of steel per well, would require about 662,000 tons of steel. Some sources, however, say that the actual requirement per well would be closer to 40 tons, which on this basis

would require approximately 530,000 tons of steel. On the present basis of operations and steel quotas, steel companies probably will be able to furnish 400,000 tons of oil country goods for the balance of the year, and with the bomb program drastically cut back, the oil industry may see a realistic approach to its steel requirements.

The controversy over steel requirements, however, does not cover up the fact that oil reserves in this country have been declining drastically over the past few years, and most of this has been due to the inability of the wildcat operator to play his proper role, whether it be from the price or steel angle. It now appears as if the WPB is attempting to discharge its obligations by making steel available for the small producer. This will leave the ball in the hands of the PAW and the OPA as far as price and actual requirements are concerned.

There are already some rumors in the oil industry that the California field will be exploited to the fullest extent as soon as possible. The reason for this is said to be the possible heavy requirements of the United States and British Navies which will be operating in the South Pacific in a much stronger effort after the European phase of the war comes to a close.

The more serious critics of the United States oil situation insist that our reserves have become so depleted and new explorations retarded that the importation of oil after the war or sooner from South America is not unlikely. It is for this reason among others that many observers in the oil and gas industry insist that the two large government pipe lines—the 20 in. and 16 in.—will, after the war, be transporting gas for the most part instead of oil.

### Three New Names Added to WPB Roster

#### Washington

• • • Harold Ickes, secretary of interior, Joseph B. Eastman, director, ODT, and Paul McNutt, WMC chief, were named by the President recently to be members of WPB. Mr. Ickes said that he would become a member because the President desired it, but that membership in WPB involved "vociferous discussion" and that he would rather be an onlooker than a participant.



## NEWS OF INDUSTRY

### Army Cut 14% on Steel It Requested

• • • The steel industry had better regard changes in the emphasis in munitions production merely as temporary measures, and not count too heavily upon reports of overproduction, asserted H. G. Batcheller, director of the WPB Steel Division, in a speech last week in Cleveland before the National Open Hearth Committee and the Blast Furnace and Raw Materials Committee of the AIMME.

Mr. Batcheller expressed the opinion that changing requirements dictated by military strategy and battlefield experience "will not permit us to ease our restrictions on non-essential uses of steel." Of the six largest steel consumers, the railroads are going to take the largest reduction of steel requirements in third quarter, he said.

The speaker revealed the specific percentage reductions in major claimant agency requests for steel which the Steel Division has recommended to the WPB requirements committee:

Total requests by the 16 claimant agencies for third quarter amounted to about 21,000,000 tons of finished carbon steel. Available for allocation will be about 15,000,000 tons.

The War Department request for carbon steel to be delivered during July, August and September will have to be cut by about 14 per cent. And its request for alloys will have to be trimmed by about one-sixth. The War Department is the largest consumer of steel among the claimant agencies.

The amount of carbon steel which the Steel Division has recommended for allocation to the Navy during the third quarter is 20 per cent less than the stated requirement, and the Navy, like the Army, probably will have to get along with one-sixth less alloy steel during the third quarter than it requested.

The Steel Division has recommended a reduction of about 22 per cent in Maritime Commission requests for carbon steel, 32 per cent in the Lend-Lease administration requests, and 40 per cent in the Office of Defense Transportation request.

New production records are being made in alloy steel, said Mr. Batcheller. In March, 1,264,679 net tons were produced, he announced.

### UMW Agrees to Firing 141 Ford Men

• • • A series of work stoppages in the aluminum and steel foundries of Ford Motor Co. was halted over the weekend with the discharge of 141 men following a conference between the company and UAW officials. Most of the discharged men were new employees with the company less than six months. They were said to be ring leaders in tie-ups, extending over several days which cost 56,136 man-hours of work.



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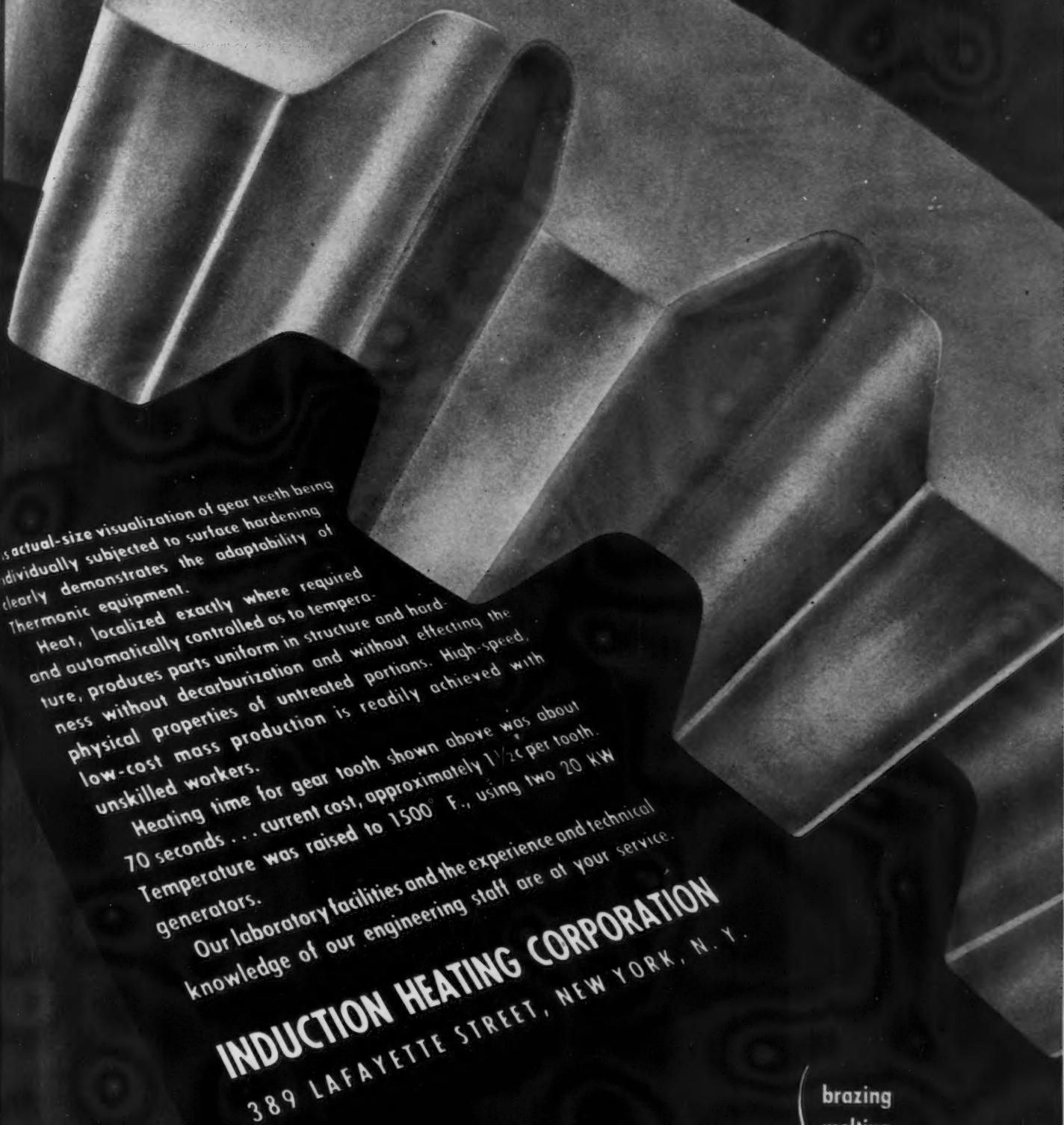
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## NEWS OF INDUSTRY

### Trade Notes

Henry L. Crowley & Co., Inc., West Orange, N. J., has extended its activities to compacted-metal fabrication of intricate shapes and sizes. Crowley technicians have developed their own compacted-metal process.

L. T. Swallow and Associates, Boulevard Building, Detroit, has been formed to provide a new packaging and packing service to prime and sub-contractors of war material.

Johnston & Jennings Co., Cleveland, manufacturer of Oceco tank fittings and Stowe industrial stokers, has purchased the exclusive manufacturing and sales rights of Rusta-Restor, a cathodic process for preventing rusting of water tanks, piping, and similar steel structures.

Wendt-Sonis Co., Hannibal, Mo., has reduced its prices 20 per cent on its entire line of both straight and tapered shank, carbide-tipped reamers, which range in size from  $\frac{1}{4}$  to  $1\frac{1}{2}$  in. The reduction results from increased volume of sales and acquisition of new production facilities.

SKF Steels, Inc., has moved its main office to the Graybar Building, 420 Lexington Avenue, New York.

Auer Engineering Co., Milwaukee, has been organized by Darwin B. Stricklin and George O. Renner to operate a machine shop.

Hardcote Process Co., Milwaukee, is a new firm organized by Theodore and Martha Salter and Charles Rothweiler to engage in the heat treating business.

William Didier Mfg. Co., Racine, Wis., has been organized by Julius Alperovitz, William Kenton and Max and William Seft to manufacture machinery, tools and equipment.

General Finance Corp. has acquired the McAlear Mfg. Co., Chicago producer of valves, regulators and control equipment used in the oil and general industrial fields. McAlear will function in conjunction with the Climax Engineering Co., Clinton, Iowa, also owned by General Finance. Climax will produce castings for McAlear under sub-contract, thus enabling McAlear to expand its present capacity operations.

### COMING EVENTS

May 5 to 6—SAE National Transportation and Maintenance meeting, New York.

May 10 to 12—Mill Supply Convention, Cincinnati.

May 17 to 18—National Association of Sheet Metal Distributors, Cleveland.

May 17 to 19—American Gear Manufacturers Association, Rye, N. Y.

May 24, 25, 26—National Association of Purchasing Agents, New York.

May 27—American Iron & Steel Institute, New York.

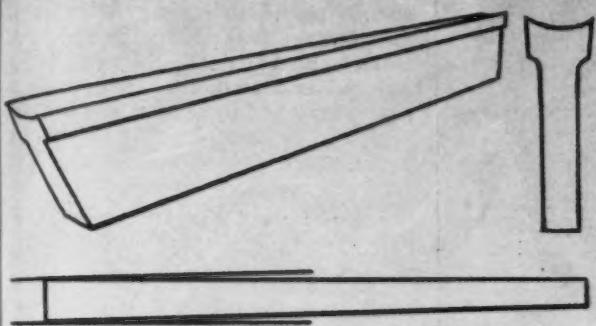
May 27—National Metal Trade Association, Chicago.

June 9 to 10—SAE War Materiel meeting, Detroit.

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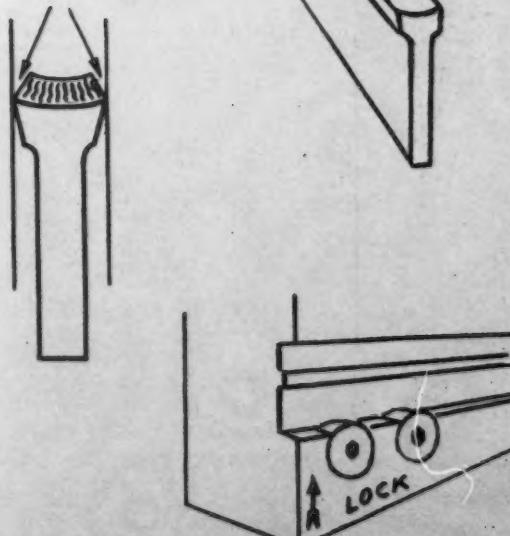
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## Briefly Told—

**Lake Shipping Rates;  
Tornado Holds Up War  
Production; Other News**

- According to a dispatch from Cleveland, a meeting of representatives of grain, ore, coal, and limestone shippers held with OPA officials from Washington, took action April 29 to establish Lake shipping rates for the coming shipping season. At present, maximum price ceilings govern the rates, based on the highest rates charged in March, 1942, with certain inequalities and inequities that are expected to be cleaned up by a straight dollars-and-cents price ceiling. The shipping company representatives on the whole agreed to carry on with last year's rates. However, to aid OPA in setting up a dollars-and-cents basis for rates, representatives of carriers nominated a committee of seven to act in an advisory capacity to the OPA.

- Weaving an erratic, but none the less devastating, path west to east through Cleveland and then angling south toward Akron, a tornado on April 27 left behind it destruction and debris in residential and industrial sections that when totaled will add up to hundreds of thousands of dollars and temporarily curtail production in some of the district's war plants. Extensive damage was done to the Newburgh plant of American Steel & Wire Co. At Republic Steel Corp. damage was estimated at \$25,000.

- Showing how industry can meet emergency replacement requirements on a battlefield 3000 miles away, an order was received and filled in Baltimore recently by the American Hammered Piston Ring Division of Koppers Co. and on its way to Africa the next day. Piston rings were needed for ships no longer manufactured but still in use in maintaining communications in North Africa. There was no existing stock, so the company unearthed the necessary information and the rings were delivered to the Baltimore airport next afternoon.

- Redistribution of tools immobilized in industrial plants was urged upon members of the Industrial Supply Distributors' Industry Advisory Committee at its initial meeting with representatives of the Wholesale and Retail Trade Division.

- Navigation at the port of Buffalo "opened" at 1 p. m. April 21 with 13 big freighters nosing out into an ice field extending 70 miles up Lake Erie. The opening was 24 days behind that of 1942 and put a heavy handicap on the ore carrier fleet to meet government demands of 95,000,000 tons during this season.

- Steel-toe safety shoes no longer require a No. 17 coupon, issued in a



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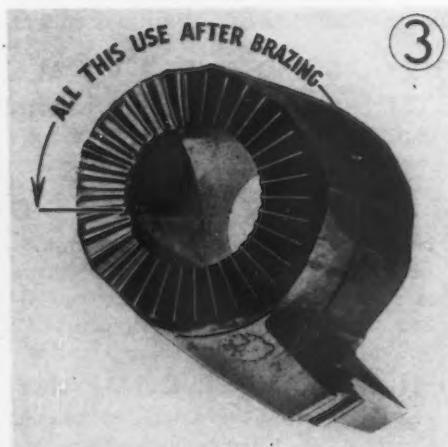
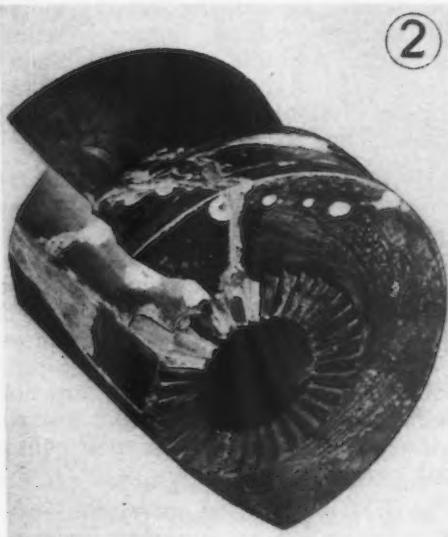
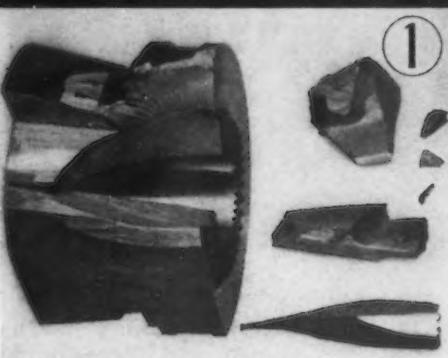
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## BRIEFLY TOLD

worker's ration book, when being purchased. OPA has issued a new regulation permitting industry itself to take applications for safety shoes for its employees.

Manufacturers planning to adapt their foundries to the casting of newer magnesium and aluminum alloys may use the same type moulding machines as those now used for iron and steel, according to Russell F. Lincoln, sales manager of the machine division of the Osborn Mfg. Co., Cleveland.

A saving of 437,500 manhours and \$341,200 annually in the cost of operation at Picatinny Arsenal, Dover, N. J., has been effected by the Army Ordnance Department through adoption of 22 suggestions for improvement in work technique by civilian employees of the Arsenal, the War Department has announced.

DPC has agreed to finance the extension of a 20-in. petroleum products pipe line to the harbor area of New York, according to a recent announcement by Jesse Jones, Secretary of Commerce. Jones also announced that the 8-in. Plantation Pipeline has begun to pump 30,000 barrels of petroleum products per day to its terminal at Richmond, Va.

Chrysler Corp. is meeting manpower problems by spreading its production more completely than was necessary in peace time. Division of war work among plants indicates that 46 per cent of eventual total war employment will be located outside of Detroit.

Price reductions on war production contracts, refunds by contractors and miscellaneous recoveries effected through renegotiation of contracts by the War and Navy Departments and the Maritime Commission between April 28, 1942, and March 31, 1943, amounted to \$2,539,900, according to OWI.

Locker rooms planned to provide for complete drying of workers' clothes while hanging within ventilated locker cabinets, are being installed in several large industrial plants. Designed and under construction by the Rust Engineering Co., Pittsburgh.

A comparatively small amount of rubber from the Goodyear Tire & Rubber Co. plants has helped perfect a new steel-mill process which is accelerating the flow of tin for U. S. Army food cans. The process utilizes a ton and a half of rubber for tank and pipe linings.

Savings to the government of more than 600 million dollars in construction costs alone have resulted from improved processes developed in recent years by du Pont engineers and chemists, said Thomas H. Chilton, of E. I. du Pont de Nemours & Co., when he accepted the 1943 Eggleston Medal of the Engineering Schools of Columbia University.

Joseph B. Eastman, director of ODT, has asked business and industry to begin and end all employee vacations on Tuesdays, Wednesdays or Thursdays, and to schedule employee vacations throughout the year.

Research on synthetic rubber by the B. F. Goodrich Co. has resulted

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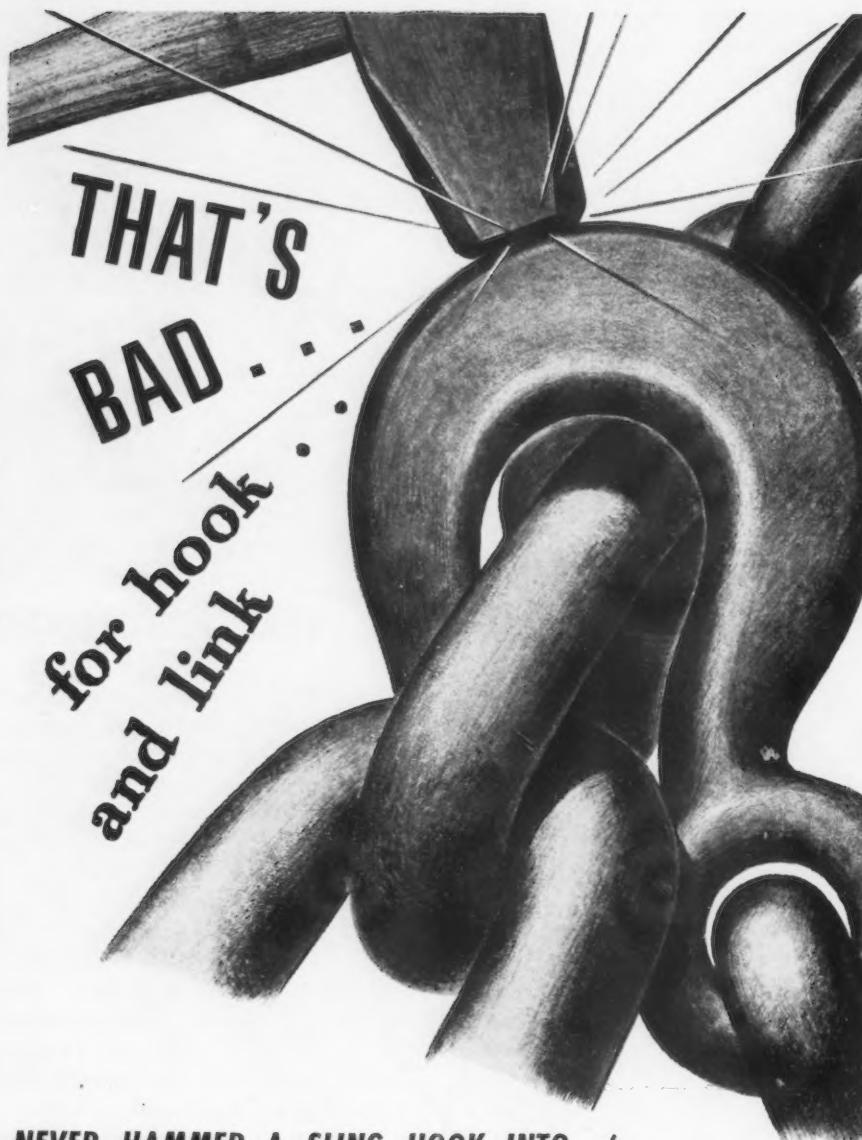
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#### BRIEFLY TOLD

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• The present shortage of industrial oxygen will continue until early 1944, when it is expected that new plant facilities should be completed, it was stated at a meeting of the Oxygen and Acetylene Industry Advisory Committee held recently in Washington. The shortage of calcium carbide is also expected to prevail throughout 1943.

• Shipments of fabricated structural steel for March showed a slight increase over the two previous months, according to reports received by the American Institute of Steel Construction. Exclusive of export, shipments for the first three months of the year totaled 324,483 tons as compared to 523,614 tons shipped in the corresponding period last year.

• Use of substitutes for steel in the construction of the new Gwynedd, Pa., plant of SKF Industries, Inc., has resulted in the saving of enough of this vital material to build 68 medium tanks or one large destroyer, it was announced recently. The newly completed plant is to be used for the production of aircraft bearings.

• In its War Year Book for 1942, Pratt & Whitney Division of Niles-Bement-Pond Co., West Hartford, Conn., has highlighted in graphic form the main events of the year as they affected the plant and its employees, including draft registration, finger printing, gasoline rationing and many other individual headaches.

• An animated film on the theory and principles of steam turbine operation has been completed by Allis-Chalmers Mfg. Co. and is now available for showing. The film is designed to aid in training new war workers in power plants, instructing student engineers and to educate powerhouse operators and maintenance men.

• American Central Mfg. Corp., Connersville, Ind., is raising garden products on 12 acres of company-owned land and making those products available without cost to employees, Saunders P. Jones, president, said. The planting and cultivating will be done at company expense.

• Pliolite, a product of the Goodyear Tire & Rubber Co., Akron, is now being used for the self-sealing fuel tanks of warplanes and for wire insulation. Pliolite is developed from natural rubber.

• Officials of foreign purchasing commissions, welding engineers and large users of welding supplies are invited to an unusual show at Cleveland, by the Moslo Machinery Co., some time in June. A welding rod processing plant, complete in every detail from cutting machine to packaging, will be demonstrated in action.

• A little foundry over in Waukesha,



22 Months "On the Line"  
and Still Going Strong

## SOLNUS HYDRAULIC OILS

**Stay On The Job After 12,318 Hours of Continuous Service**

A large wire products manufacturer, now engaged in vital war work, operates four hydraulic press welders. Almost two years ago these welders, each with a capacity of 30 gallons, were filled with SOLNUS HYDRAULIC OIL.

After 12,318 hours of continuous operation, without the slightest trouble of any kind, a sample of the oil was taken from each welder and subjected to careful laboratory tests. These tests showed no appreciable change in flash, fire, viscosity or acidity of the oils and indicated that they were in suitable condition for long, continued use.

This is just one more example of the way in which

SOLNUS HYDRAULIC OILS are helping to keep war plants on round-the-clock production schedules . . . by abolishing frequent time-consuming and costly shutdowns for cleaning and oil changes.

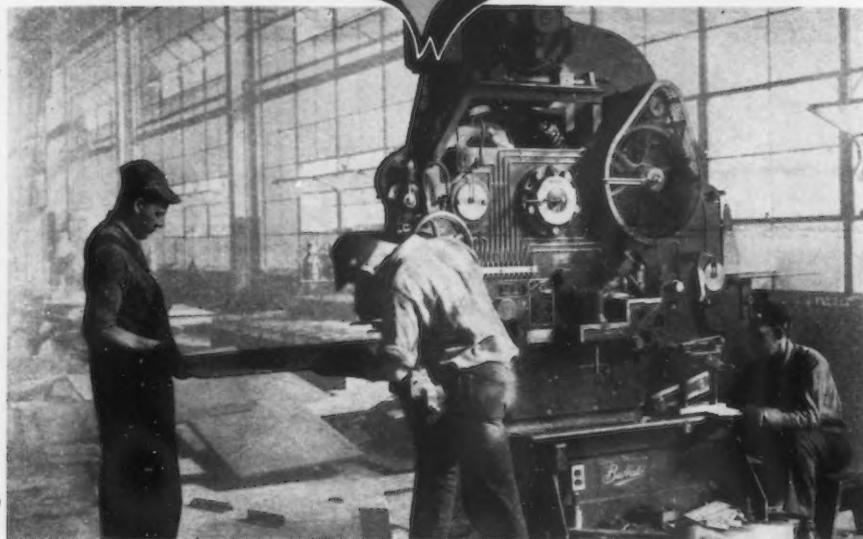
If sludge-clogged oil lines, faulty pressure or frequent oil changes are throwing your production schedules off balance, it will pay you to call in a SUN "Doctor of Industry." Let him show you how SOLNUS HYDRAULIC OILS can give you the kind of service you need to keep your hydraulic equipment in continuous service and save money. Write  
**SUN OIL COMPANY • Philadelphia**

Sun Oil Company, Limited, Toronto, Canada

# SUN PETROLEUM PRODUCTS

**SUNOCO**  
HELPING INDUSTRY HELP AMERICA

*Active* "EXPEDITER"  
in the  
**ARMAMENT RACE**



"Buffalo"

## UNIVERSAL IRON WORKER

- This giant heavy-duty tool, with a couple of operators at the controls, literally converts them into a whole crew of skilled metal fabricators! Swiftly, accurately, difficult types of armament fabrication move along on schedule. Such work as punching, shearing,

slitting, coping and notching are finished with dispatch, and a wide variety of stock and forms are handled. . . . Here, as in so many ways, Buffalo ingenuity of design plus Buffalo quality constructing, is fighting for unconditional Victory!



**BUFFALO FORGE CO.**  
492 BROADWAY      BUFFALO, N. Y.

Branch Engineering Offices in Principal Cities

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

BRIEFLY TOLD

### Bell Inaugurates New Victory Shift

Buffalo

\* \* \* The "Victory Shift" inaugurated recently by Bell Aircraft Corp., Buffalo - Niagara Falls, has resulted in more than 500 men and women signing up for three-day-a-week jobs in the company's plant. Opposed to the four-hour emergency trick, Bell adopted the three-day plan to lure more workers from non-war industries. When one Victory shifter completes his three days another works the next three to provide one full man-week.

Wis., is having difficulty because it happens to be located in violation of the city's zoning ordinance. It has appealed to the WPB to restrain the city attorney from enforcing a removal order. The foundry is loaded with war production work 16 to 18 hr. a day.

\* A recent survey reveals that wartime workers want hot foods for lunch. One old established lunch firm now has some 23 trucks delivering to 150 plants.

\* Because of the shortage of copper silver is now being used to carry current in electric equipment, according to L. A. Umansky in a recent speech. The use of silver presents problems, however, for our silver supply, measured by silver standards, is less than 2 per cent of our annual copper consumption.

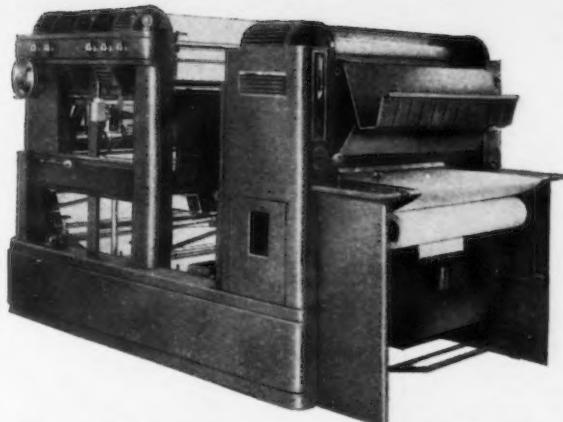
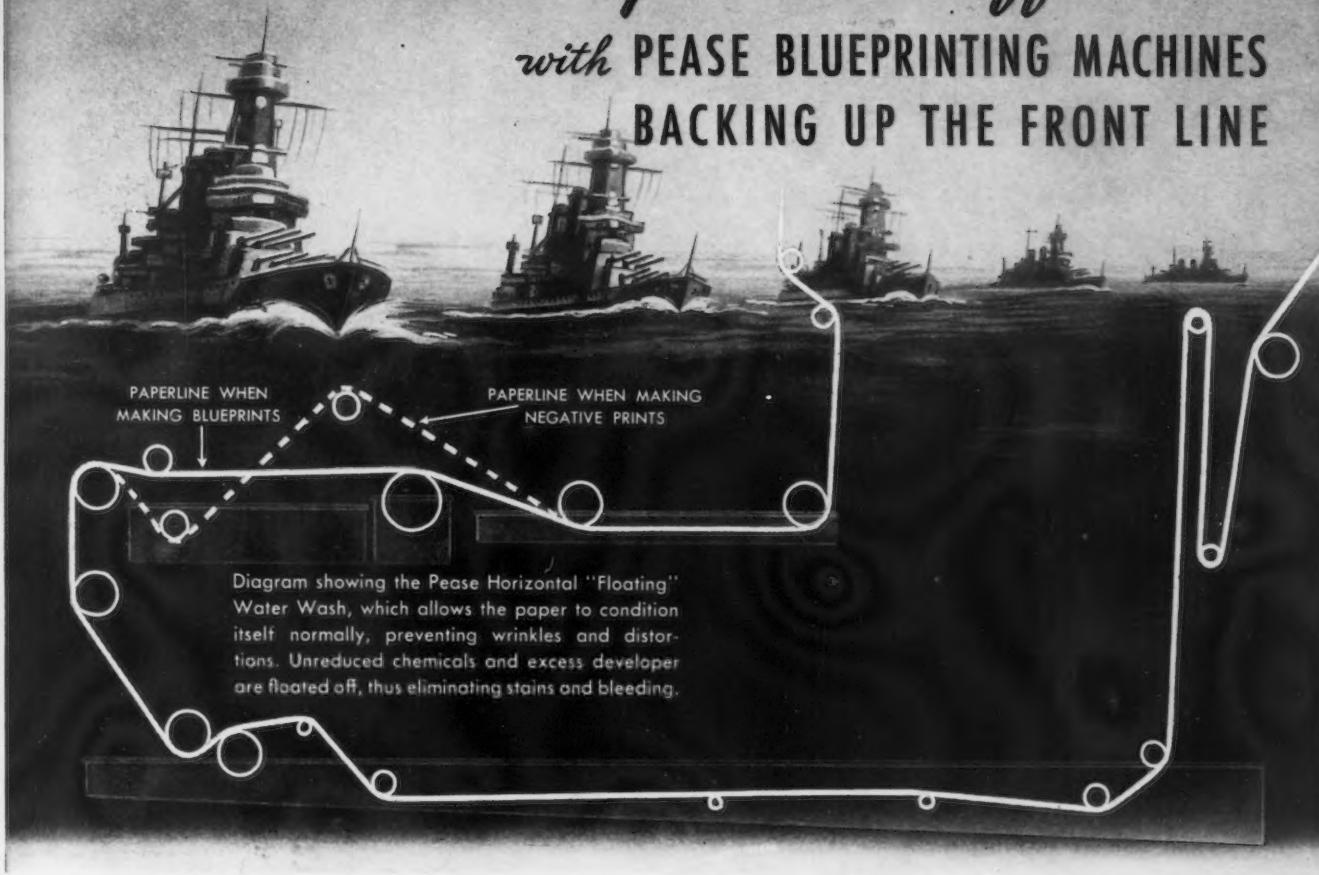
\* New grades of brushes for ring and commutator applications have been developed for the aviation and electrical industries by Keystone Carbon Co., St. Marys, Pa. Certain types were developed specifically for current control apparatus where extreme precision is vital. Low contact drop, high current carrying capacity and a low coefficient of friction are said to be inherent characteristics of these brushes.

\* A heavy duty, 20-ton overhead crane, built from scrapped and salvaged parts by the Oakland Maintenance Division of General Metals Corp., is now in operation in the company's Iron Plant Division, Oakland, Cal. Its construction saved an 18-months' production delay threatened by the late delivery of a vitally needed crane.

\* Elmer J. Kopf, formerly of the advertising division of Republic Steel Corp., Cleveland, has joined the organization of the G. M. Basford Co., national industrial advertising agency in New York, where he will handle advertising of accounts in the steel and metal working industries. Prior to his connection with Republic in 1937, Mr. Kopf was advertising and sales promotion manager of Union Drawn Steel Co., Massillon, Ohio, and, before that time, was engaged in agency work.

# American Industry is on the Offensive

with PEASE BLUEPRINTING MACHINES  
BACKING UP THE FRONT LINE



**Pease Model "22-16"** — Continuous Blueprinting, Washing, Developing and Drying Machine—Production Speed, 20 feet per minute. (Model "22," not shown, has a Production Speed of 30 feet per minute.)

#### PEASE SPECIAL FEATURES

Sliding "Vacuum-like" Contact smooths out tracings—Three Speed Lamp Control provides operation at 10, 15, or 20 amperes, does away with running speed and dryer heat changes—Actinic "No-Break" Arc Lamps burn for 45 minutes without breaking arc, resume instantaneously—Horizontal Water Wash floats prints free from tension and prevents wrinkles, stains, bleeding—Quick Change Chemical Applicator System very economically allows change from Blueprints to Negatives in 30 seconds—Rapid Drying Drums, heated by gas or electricity, are thermostatically controlled.

Practically every place where there is war production Pease Blueprinting Machines are on duty delivering millions of Blueprints to keep American Industry on the offensive—for Blueprints precede and maintain production lines. Top Speed Pease Machines, with a Blueprint production of 30 feet per minute, are not merely meeting requirements; they are ahead of schedule.

The Horizontal "floating" Water Wash, just one exclusive Pease feature, prevents stains, bleeding, wrinkles and distortions. The finished blueprints are contrasty, with sharp white lines and dark blue backgrounds. They truly lie "flat as hung wallpaper," are easy to handle and economical to make. Read about the other Pease Special features and write for complete information.

**THE C. F. PEASE COMPANY**  
2695 West Irving Park Road • Chicago

**Blueprinting Machines**

A TYPE AND SIZE FOR EVERY REQUIREMENT  
INCLUDING DIRECT PROCESS PRINTING



Don't wait until you are face-to-face with critical problems concerning corrosion and contamination. Get the facts about *Amercoat* now!

*Amercoat* protects metal, concrete and wood surfaces from corrosion by many different acids, alkalies and chemical compounds now required in the manufacture of vital war and food supplies.

*Amercoat* likewise, protects

these same essential materials and food products from contamination by products of corrosion.

Thus, *Amercoat* does an important two-way job these days... equipment must be protected because replacements are hard to get... precious materials must not be wasted.

#### EASY TO APPLY BY CONVENTIONAL METHODS

*Amercoat* compounds are inert thermoplastic coatings. When sprayed or brushed on metal, wood or concrete, they provide an impervious, odorless and tasteless surface. Ordinary industrial spray painting equipment can be used for application.

Get the facts about *Amercoat* now. Tell us your problem... and we'll show you how to solve it with *Amercoat*... or tell you frankly *Amercoat* isn't the answer.

*Amercoat* is impervious to the corrosive action of such varied materials as: Aviation Gasoline... Sea Water... Ammonium Nitrate Alcohol... 40% Formaldehyde... Lactic Acid... 50% and 75% Caustic Soda... Concentrated Magnesium Chloride Brine... Drinking Water.

*Amercoat*  
DIVISION

AMERICAN PIPE & CONSTRUCTION COMPANY  
P.O. BOX 3428, TERMINAL ANNEX • LOS ANGELES, CALIF.

#### NEWS OF INDUSTRY

#### More Industry Groups Are Selected by WPB

• • • The Director of Industry Advisory Committees, WPB, has announced the formation of the following industry advisory committees during the past week:

#### STEEL MILL MAINTENANCE & REPAIR INDUSTRY ADVISORY COMMITTEE

Committee members are: J. K. Bole, Republic Steel Corp., Cleveland; Harry M. Chapman, Acme Steel Co., Chicago; Philip L. Coddington, The Carpenter Steel Co., Reading, Pa.; T. J. Hudson, Weirton Steel Co., Weirton; P. S. Killian, Bethlehem Steel Corp., Bethlehem; F. M. McCleery, Sharon Steel Corp., Sharon; William Morris, Jones & Laughlin Steel Corp., Pittsburgh; W. H. Stapleton, Inland Steel Co., Chicago; C. G. Stroto, U. S. Steel Corp., Pittsburgh; J. S. Thomas, American Rolling Mill Co., Middle-town.

#### AUTO WRECKERS INDUSTRY ADVISORY COMMITTEE

Committee members are: Dallas B. Coffield, Coffield Bros., Norfolk, Va.; L. L. Gibson, Junction Auto Parts, Jackson, Mich.; Sam Glassman, Nottingham Auto Wrecking Co., Cleveland; Simon Goldstein, St. Louis Auto Parts, St. Louis; Harry I. Goodman, O. K. Auto Parts, San Antonio; Jack Harris, Harris Auto Parts, Denver; F. H. Hood, Atlanta Auto Parts Company, Inc., Atlanta; Morris Kaplan, Middlesex Auto Exchange, Inc., Cambridge, Mass.; Max Rappaport, Northwest Auto Parts, Minneapolis; Thomas Sharkey, Bronx, New York; Roy Warshawsky, Chicago; Lloyd Willock, B & W Auto Wreckers Co., San Francisco.

#### TRACTOR INDUSTRY ADVISORY COMMITTEE

Committee members are: W. L. Clark, J. I. Case Co., Racine, Wis.; R. W. Hautenroeder, The Fate-Root-Heath Co., Plymouth, Ohio; R. A. Keck, Keck-Gonnerman Co., Mt. Vernon, Ind.; R. M. Kyes, Harry Ferguson, Inc., Dearborn, Mich.; P. H. Noland, B. F. Avery & Sons Co., Louisville, Ky.; A. W. Pettersson, Thieman Harvester Co., Inc., Albert City, Iowa; W. A. Roberts, Allis-Chalmers Mfg. Co., Milwaukee; E. F. Schiele, Massey-Harris Co., Racine, Wis.; J. L. McCaffrey, International Harvester Co., Chicago; A. W. Newby, Huber Mfg. Co., Inc., Marion, Ohio; Merle S. Tucker, Oliver Farm Equipment Co., Chicago; Frank Siloway, Deere & Co., Moline, Ill.; W. B. Taylor, Minneapolis-Moline Power Implement Co., Minneapolis; J. R. Love, Love Tractor, Inc., Eu Claire, Mich.

#### COMMERCIAL DROP FORGING INDUSTRY ADVISORY COMMITTEE

Committee members are: A. D. Armitage, J. H. Williams Co., Buffalo; R. G. Carrier, Federal Drop Forge Co., Lansing, Mich.; James A. Cook, Standard Forgings Co., Chicago; Edwin Hodge, Jr., Pittsburgh Forgings Co., Coraopolis, Pa.; J. F. Rice, Drop Dies & Forgings Co., Cleveland; R. R. Smith, Milwaukee Forge & Machine Co., Milwaukee; Harry G. Stoddard, Wyman-Gordon Co., Worcester, Mass.; C. E. Stone, Interstate Drop Forge Co., Milwaukee.

#### BARN AND BARNYARD EQUIPMENT INDUSTRY ADVISORY COMMITTEE

Committee members are: David J. Gemmell, Cleveland Chain & Mfg. Co., Cleveland; J. A. Gray, Harry J. Simons Lumber & Mfg. Co., St. Paul; C. A. Guttenkunst, Jr., Milwaukee Hay Tool Co., Milwaukee; R. C. Hudson, H. D. Hudson Mfg. Co., Chicago; R. W. Louden, The Louden Machinery Co., Fairfield, Iowa; Stephen Mahon, James Mfg. Co., Fort Atkinson, Wis.; H. B. Megram, Starline, Inc., Harvard, Ill.; D. D. Miller, III, The Ney Mfg. Co., Canton, Ohio; C. D. Leiter, The F. E. Myers & Brother Co., Ashland, Ohio.

#### FARM ELEVATOR & BLOWER INDUSTRY ADVISORY COMMITTEE

Committee members are: J. W. Coxon, Portable Elevator Mfg. Co., Bloomington, Ill.

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## Will Peace Come In Our Time?

Most certainly it will—and sooner than you may expect! With it will come the crucial test of whether or not American industry can convert as efficiently to peace as it has to war. From our extensive relations with hundreds of varied manufacturers we know of scores of amazing new products that only await the message of peace to come into being. Everyone looking ahead to that great day can even now count on the assistance of the Weatherhead plants which are producing vital parts for planes, tanks, ships, cars and trucks at the rate of *millions every day!*

Look Ahead with



# Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND, OHIO

*Manufacturers of vital parts for the automotive, aviation,  
refrigeration and other key industries.*

Plants: Cleveland, Columbia City, Ind., Los Angeles  
Canada—St. Thomas, Ontario

# Spotlighting THE COMPLETE LINE OF

Schedules are tough today! So why take chances with inferior molding machines? Play safe! Specify the dependable MILWAUKEE Molders. They are built BY foundrymen FOR foundrymen, and are backed by more than 22 years' specialized experience in this field.

In the complete MILWAUKEE line, you'll find a model to meet every molding requirement. Every machine is engineered to keep pace with today's urgent demand for speed, speed and more speed . . . yet maintaining high standards of quality.

Designed with the fewest number of working parts, MILWAUKEE Molders are built to take hard everyday punishment. Steel castings and alloy steels are used wherever stress is applied. Close-grained, high-tensile grey iron is used wherever wear occurs. Instead of links and levers, rigid integral members are employed for alignment. Hardened pins and bushings serve as guides. Correct lubrication is provided. All parts are accurately machined to close tolerances. Adjustments are very accessible and easy to make.



Call in a Milwaukee Foundry Equipment Engineer

Our engineering and sales department personnel is composed of practical, seasoned foundrymen, familiar with all phases of the industry. This broad experience enables our men to study your molding and core making problems intelligently, and arrive at a solution that is both practical and economical.

## Milwaukee Hydraulic BRIQUETTING PRESS

The ORIGINAL hydraulic briquetting press for converting borings and turnings into usable form. Reclaims the highest percentage of materials . . . affords better metal control . . . effects substantial savings in mailing costs. Used by practically ALL automotive manufacturers and other large industrial plants. Illustration shows large Model 350 machine. Four other models available.

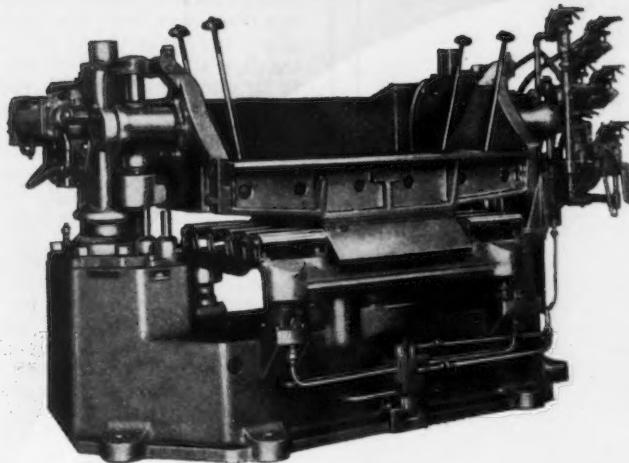


# MILWAUKEE

MANUFACTURERS OF MOLDING MACHINES AND BRIQUETTING PRESSES

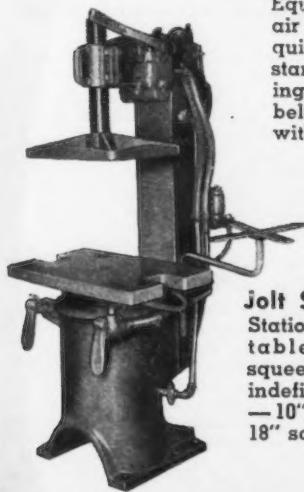
# MILWAUKEE MOLDERS

Designed • Built • Sold and Serviced BY EXPERIENCED FOUNDRYMEN



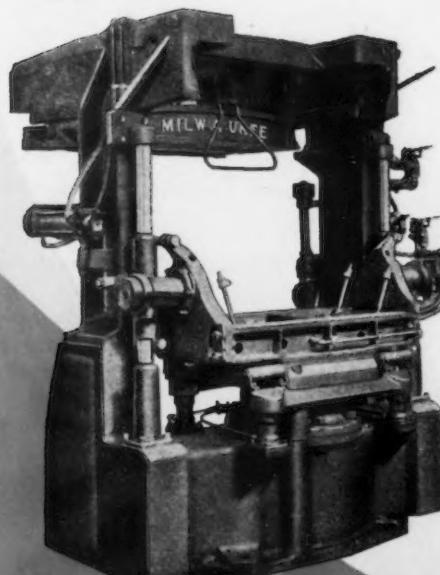
Jolt Rollover Draw

Equipped with automatic air clamps, power rollover, quick-acting pistons and instantaneous hydraulic leveling. Draw pistons above or below floor line. Available with or without jolt. 6 sizes.



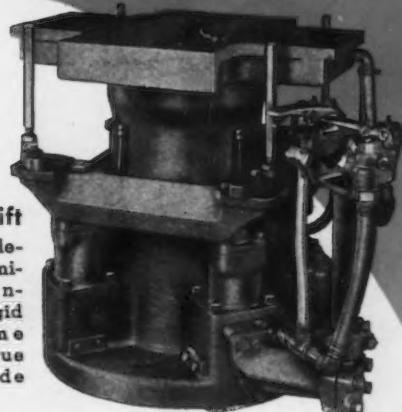
Jolt Squeezers

Stationary or portable — Parallel squeeze maintained indefinitely. 4 sizes — 10", 12", 13" or 18" squeeze pistons.



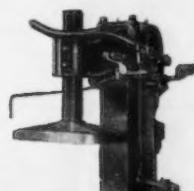
Jolt Squeeze  
Rollover Draw

Power rollover with automatic leveling and smooth pattern draw. 3 sizes available—16", 19" and 21" squeeze cylinder diameters.



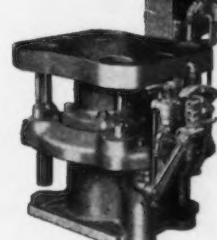
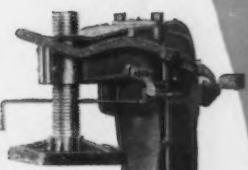
Jolt Pin Lift

Simple in design to eliminate maintenance. Rigid draw frame insures true draw. Made in 6 sizes.



Jolt Squeeze  
Stripper

Arm type, production molder with air-dogging mechanism for stripping. Available with 16" or 19" squeeze pistons.



Jolt Squeeze Pin Stripper

The triple duty molder. Use it as a jolt squeezer, as a jolt squeeze pin stripper or pin lift machine. 5 sizes available — 12", 14", 16", 19" and 21" squeeze pistons.

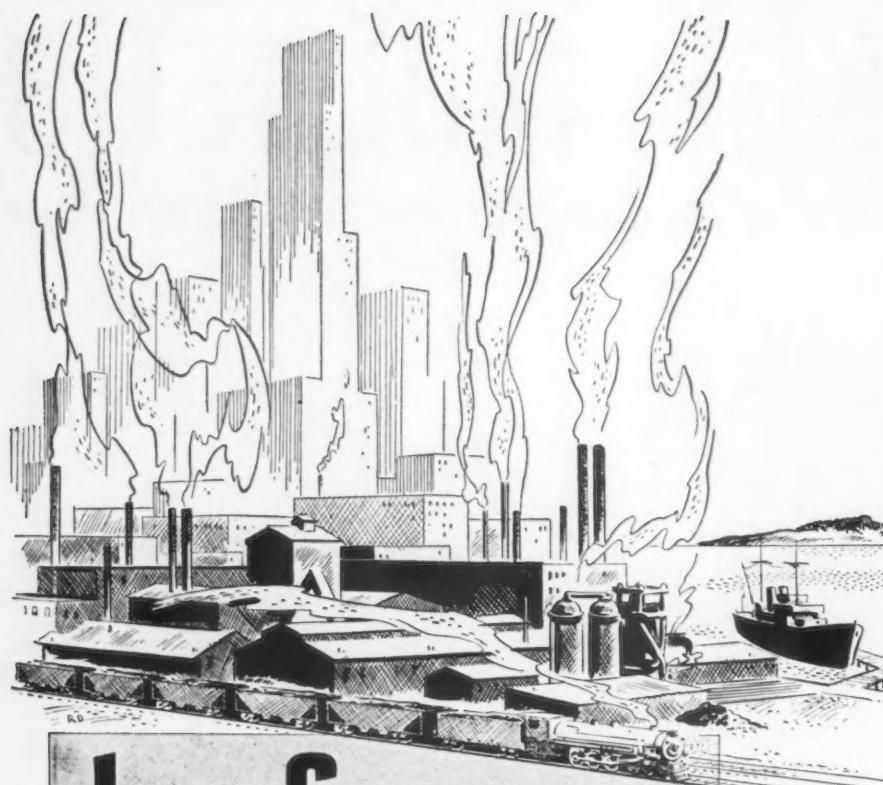


Jolt Squeeze  
Stripper

Car suspended squeeze platen permits fully automatic overhead mold removal. 21" or 24" squeezing pistons.

Foundry Equipment Co.

3238 WEST PIERCE STREET • MILWAUKEE, WISCONSIN, U.S.



## Less CARE with CAREY

Ask any power engineer why he likes Carey Insulations . . . any owner of a Carey Roof why he favors this particular roof . . . any user of other Carey Products what he thinks of them . . . the answer is—"DEPENDABILITY."

"Dependable Products since 1873" represents much more than a slogan. It is proof of long experience—an evidence of scientific research—an assurance of high quality.

The result is that Carey Products stand up to the conditions for which they were made. They are dependable in service, economical in cost, reduce maintenance and deliver plus values. Industry uses them with confidence. If your needs include products of Asphalt, Asbestos and Magnesia it will be to your advantage to consult a Carey representative. A nationwide organization is ready to serve you. Write our nearest Branch Office or address Dept. 26.



### THE PHILIP CAREY MFG. COMPANY

*Dependable Products Since 1873*

LOCKLAND, CINCINNATI, OHIO

In Canada: The Philip Carey Company, Ltd., Office and Factory:  
Lenoxville, P. Q.

### NEWS OF INDUSTRY

#### Production of Bombs Eased in Some Sizes

##### Pittsburgh

• • • It is said here that the United States bomb production program has been cut drastically, even stopped on some smaller sizes. Supplies are said to be plentiful, although production probably will continue on some of the larger sizes.

One tube company no longer is making 100 and 200-lb. bombs, and will soon complete orders on 500-lb. bombs, according to reports. No personnel problem is involved because it is expected that the company will be able to utilize its workers by producing urgently needed oxygen and acetylene tanks, which have a high rating for war use. Orders for steel shell cases have been increasing. A large contract may be placed in the Pittsburgh district soon. The drop in the bomb program may mean more steel for users of seamless tubing, such as the oil industry.

V. P. Diedrich, Owatonna Mfg. Co., Owatonna, Minn.; S. D. Getz, The Meyer Mfg. Co., Morton, Ill.; C. E. Redborn, U. S. Wind Engine & Pump Co., Ba.avia, Ill.; Frank Siloway, Deere & Co., Moline, Ill.; H. C. Wallace, Link Mfg. Co., Fargo, N. D.; L. J. Peterson, Stainless & Steel Products Co., St. Paul.

##### WHEELBARROW INDUSTRY ADVISORY COMMITTEE

Committee members are: J. A. Anderson, Toledo Wheelbarrow Co., Toledo; G. W. Atkins, Buch Mfg. Co., Elizabethtown, Pa.; J. E. Core, Jackson Mfg. Co., Harrisburg, Pa.; Floyd Evans, The Slusher McLean Scraper Co., Sidney, Ohio; R. T. Faucett, Chattanooga Wheelbarrow Co., Chattanooga, Tenn.; H. C. Hoeflich, Case, Crane & Kilbourne Jacobs Co., Columbus, Ohio; L. S. Holden, Construction Machinery Co., Waterloo, Iowa; C. C. Keller, General Wheelbarrow Co., Cleveland; S. E. Race, Lansing Co., Lansing, Mich.; W. H. C. Goode, American Steel Scraper Co., Sidney, Ohio; J. T. Hegner, Sterling Wheelbarrow Co., Milwaukee.

#### Officers Renominated by Metal Trades Association

##### Chicago

• • • National executive officers of the National Metal Trades Association have been renominated to serve a second term, according to an announcement by the group's nominating committee.

The renominated officers are: President, Roe S. Clark, Package Machinery Co., Springfield, Mass.; vice-president, H. H. Kerr, Boston Gear Works, Quincy, Mass.; second vice-president and treasurer, George A. Seyler, Lunkenheimer Co. Councillors for two years have also been nominated by the committee.



For armament today—for utility tomorrow.

**Howard Foundry Company**  
4900 Bloomingdale Road  
Chicago



**HOWARD**  
ALUMINUM · BRASS · BRONZE · MAGNESIUM  
CASTINGS

# Acme-Gridley Automatics MOVE INTO THE PRODUCTION BATTLE



**on 9 EUCLID CRANES**

Acme-Gridley Automatics are fighting on every production front — turning out vast quantities of vital metal parts—with characteristic accuracy, speed and economy. Handling these indispensable production units in connection with machining, assembling and shipping operations are nine Euclid Cranes.

These cranes were selected largely because of long demonstrated reliability, convenient floor control and high headroom clearance that permits high piling of heavy parts. They operate almost continuously 24 hours a day, 6 days a week.

The basic aim in designing Euclid Cranes, and Hoists, too, has always been to embody features that assure long, trouble-free service with minimum attention and upkeep cost. That they measure up to this standard is indicated by the discriminating type of purchasers—many of whom have reordered Euclid equipment each time a new demand has developed.

**THE EUCLID CRANE & HOIST CO.**

CHARDON RD., EUCLID, O.



## NEWS OF INDUSTRY

### Warehouse Chapters Pick New Officers

• • • The following chapters of the American Steel Warehouse Association have elected officers for the coming year, Walter S. Doxsey, president of the association, announced recently:

**Baltimore:** President, Harold Dell, John J. Greer & Co., Inc., Baltimore; vice-president, W. P. Wetherall, William G. Wetherall, Baltimore; secretary, J. D. Boan, United States Steel Supply Co., Baltimore.

**Buffalo:** President, J. P. Conner, Dobbie Foundry & Machine Co., Niagara Falls, N. Y.; vice-president, Edward J. Wichter, Edgar T. Ward's Sons Co., Buffalo; secretary-treasurer, Leslie N. Stetson, Peter A. Frasse & Co., Inc., Buffalo.

**Cincinnati:** President, L. E. Dallas, Peninsular Steel Co., Dayton, Ohio; vice-presidents, A. A. Hupp, Central Steel & Wire Co., Cincinnati, and D. L. McCubbin, Joseph T. Ryerson & Son, Inc., Cincinnati; secretary, Fred W. Solarek, Central Steel & Wire Co., Dayton, Ohio; treasurer, J. E. Merchant, Edgar T. Ward's Sons Co., Cincinnati.

**Connecticut:** President, R. B. Shearer, C. S. Mersick & Co., New Haven, Conn.; vice-president, S. H. Hascall, Blodgett & Clapp Co., Hartford, Conn.; secretary-treasurer, G. S. Broucco, C. S. Mersick & Co., New Haven, Conn.

**Detroit:** President, E. W. Lynch, Union Drawn Steel Division, Republic Steel Corp.; secretary-treasurer, J. Ivan Fiscus, Huron Steel Co., Inc.

**New England:** President, Quincy W. Wales, Brown-Wales Co., Boston; vice-presidents, Murray C. Harvey, A. C. Harvey Co., Allston, Mass., and G. A. Putnam, George F. Blake, Inc., Worcester, Mass.; secretary-treasurer, Carroll S. Harvey, A. C. Harvey Co., Allston, Mass.

**Northern California:** President, Howard M. Taylor, Taylor & Spotswood Co., San Francisco; vice-presidents, J. C. Hickinbotham, Hickinbotham Bros., Stockton, Cal., and Curtiss Hayden, Dunham-Carrigan & Hayden Co., San Francisco; secretary, R. D. Cortelyou, 415 Rialto Building, San Francisco.

**Northern Ohio:** President, Harry K. Hamilton, Hamilton Steel Co., Cleveland; vice-president, J. J. Halloran, Edgar T. Ward's Sons Co., Cleveland; secretary-treasurer, R. J. Foster, Republic Structural Iron Works, Cleveland.

**Pacific Northwest:** President, S. F. Woodbury, Woodbury & Co., Portland, Ore.; vice-president, John B. Robbins, A. M. Castle & Co., Seattle; secretary-treasurer, H. F. Morrow, Pacific Metal Co., Portland, Ore.

**Pittsburgh:** President, J. H. Fogwell, United States Steel Supply Co., Pittsburgh; vice-president, J. M. Hilbush, Jones & Laughlin Steel Corp., Pittsburgh; secretary, T. L. Lawry, Steel Products Co., McKees Rocks, Pa.; treasurer, F. B. Lorenz, Edgar T. Ward's Sons Co., Pittsburgh.

**Southern:** President, Frank Pidgeon, Pidgeon-Thomas Iron Co., Memphis, Tenn.; vice-president, L. H. Krieger, Jones & Laughlin Steel Corp., New Orleans; secretary-treasurer, George W. Smith, Southern Steel Co., Birmingham, Ala.

**Southern California:** President, E. Jungquist, Percival Steel & Supply Co., Los Angeles; vice-presidents, J. L. Robertson, A. M. Castle & Co., Los Angeles, and Wayne Rising, Ducommun Metals & Supply Co., Los Angeles; secretary-treasurer, L. B. Yeaton, Earle M. Jorgensen Co., Los Angeles.

### WPB Halts Highway Projects

**Washington**

• • • Thirteen highway construction projects having an estimated total cost of \$2,011,283 were ordered stopped by WPB last week. The projects are located in seven states.

# You Name the Part — Probably we make it

**Brake Shoe** MAKES PARTS FOR MANUFACTURERS ... Parts in many kinds of metals and metal alloys, compositions and fabric . . . parts that are cast, upset, drop forged and molded. In war as in peace, Brake Shoe ships millions of parts to thousands of manufacturers, in many fields of industry.

The services of our research and development engineers are available for immediate or post-war problems.  
**AMERICAN BRAKE SHOE COMPANY, 230 PARK AVENUE, NEW YORK**

#### PARTS FOR—EXCAVATING



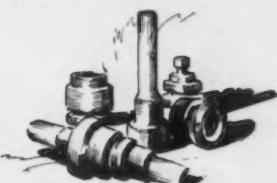
Placer dredge buckets, dredger and power shovel dippers. Quarrying, mining equipment parts. Bronze bearings.

#### PARTS FOR—SHIPS



Brass and non-metallic bearings. ABK bearing wheels. Air compressors. Parts for all types of ships.

#### PARTS FOR—MACHINERY



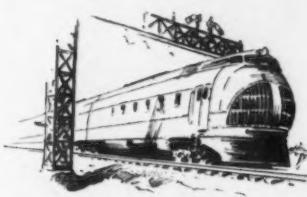
Meehanite castings, upset and drop forgings, bearings. Manganese steel gears, sheaves. Pressure castings.

#### PARTS FOR—GUNS



Upset forgings, non-ferrous parts for naval and field guns. Liners, gear blanks, parts for gun assemblies.

#### PARTS FOR—TRAINS



Brake Shoes and Meehanite castings. Manganese steel center and wear plates. Journal bearings.

#### PARTS FOR—TANKS



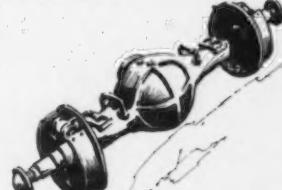
Forged shafts, transmission parts, brake levers, drain valve cages, armor plate castings. Bronze bearings.

#### PARTS FOR—PLANES



Propeller hubs, machined parts for engines, retractable landing gears. Non-ferrous castings and forgings.

#### PARTS FOR—CARS AND TRUCKS



Automotive, industrial brake lining, axle, gear blank forgings, fan belts, clutch facings. Garage equipment.

## AMERICAN

# Brake Shoe

## COMPANY

#### 58 PLANTS SERVING INDUSTRY AND TRANSPORTATION

American Brakebloc Division .....	Detroit, Mich.	Kellogg Division .....	Rochester, N. Y.
Ramapo Ajax Division .....	New York City	American Forge Division .....	Chicago, Ill.
American Manganese Steel Division .....	Chicago Heights, Ill.	Southern Wheel Division .....	New York City
Brake Shoe and Castings Division .....	New York City	National Bearing Metals Corp. ....	St. Louis, Mo.

**"BACKBONE"** GIVES THEM  
RANGE AND HITTING POWER



**"BACKBONE"** GIVES THE  
MILWAUKEE ACCURACY  
AND PERFORMING POWER

Air attack! Instantly the antiaircraft guns spring into action — pumping shells into the sky — spreading dense clouds of destructive "flak" for enemy planes. AA guns need plenty of "backbone" to hurl tons of metal to flying levels overhead.

Milling tough metals and alloys at high speeds and to close tolerances, hour after hour, isn't quite as spectacular, but the machine that handles the work must have similar backbone to withstand the ceaseless strain and vibration.

In milling machines — *rigidity* — an indispensable quality in any machine tool — originates in the column, the backbone of the machine. The column of the Milwaukee Vertical Milling Machine is engineered for the proper distribution of metal to provide a backbone that holds vibration to the minimum. The solid column back — the small openings in its neutral axis exemplify correct engineering in every detail.

It is features like this which have enabled Milwaukee Milling Machines to do more than the "usual" under the stress of wartime production.



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**KEARNEY & TRECKER**  
CORPORATION  
MILWAUKEE, WISCONSIN

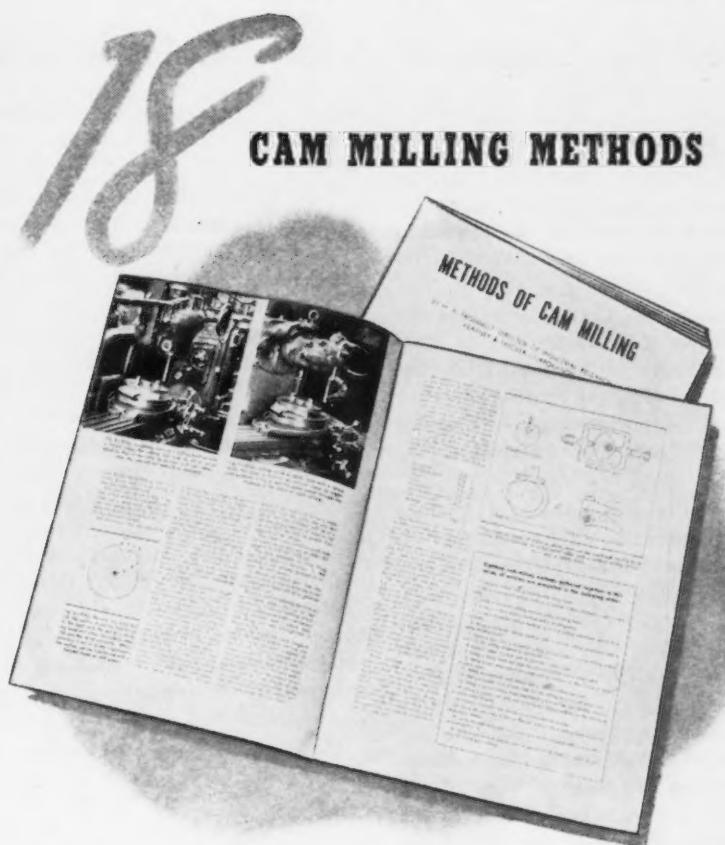
M A C H I N E   T O O L S

Buy Victory with at least 10% in War Bonds!



## Let's Put The Scrap Into The *Scrap!*

Turnings, clippings, short ends, worn out or broken tools — all these are valuable as precious scrap for remelting in the production of new steel. Surprising amounts of dormant scrap accumulate in every plant daily — collect it — segregate it. Set up a system for the regular pick-up and handling of this valuable raw material. Remember, it's a war on waste, too, and every bit of scrap collected counts in production for Victory.



## . . . Described and Explained in this Kearney & Trecker Corporation Bulletin

Machining and milling cams of various types present special problems. This series of articles, reprinted from American Machinist in bulletin form, explains methods of cam milling from the practical shopman's viewpoint.

Many machine setups are illustrated, including working diagrams. Eighteen cam milling methods are described, such as use of the Rotary Table, Dividing Head, Dummy Templates, Rotary Head Milling Machine, etc.

Written by the department of Industrial Research, Kearney & Trecker Corporation, this bulletin will prove valuable to every shopman. Write Dept. CM for your copy.

**Buy Victory with at least 10% in War Bonds!**

**Kearney & Trecker**

*Products*

C O R P O R A T I O N

M I L W A U K E E , W I S C O N S I N

Subsidiary of Kearney & Trecker Corporation

**Kearney & Trecker**

C O R P O R A T I O N

Milwaukee, Wisconsin

## Ship Plates from Irvin Works Fully Tested for Chemical Analysis, Olds Says

### New York

• • • Although a little hesitant to discuss the Truman Committee hearings covering steel plate inspection at Irvin Works because of the pending grand jury inquiry at Pittsburgh, Irving S. Olds nevertheless said at New York on April 27 that plates from the Irvin Works of Carnegie-Illinois Steel Corp. had been entirely suitable for shipbuilding. He gave figures covering the recent temporary plate production drop at the Irvin Works and went into other details.

"The really serious aspect of this affair is that the public was led to believe that the safety of our soldiers and sailors has been jeopardized by defective plates from this plant, when such was never so," said the U. S. Steel Corp. chairman. "I am not seeking to justify or condone the irregular acts of a few employees, but the importance of these acts has been exaggerated from the point of view of the overall war effort. The quality of the ship plates furnished by the Irvin Works stands unquestioned."

Two main points were brought out by Mr. Olds. First, no evidence was put before the Truman Committee that the steel had not been tested for chemical analysis at place of manufacture, or was improperly tested. In this connection, he called attention to the report of the Truman Committee stating it had been informed by the Navy that there was nothing on which the Navy could conclude that the steel furnished to it was chemically defective. Second, that the "pulled in" tests for tensile strength of a small part of the plate production at Irvin Works involved relatively minor deviations from specification requirements in a product having a margin of safety of three or four to one, and that these plates were safe and suitable for shipbuilding.

Mr. Olds pointed out that Rear Admiral Vickery, vice chairman of the Maritime Commission, stated on April 8 that although the tests of some steel at Irvin Works fell slightly below the specification, so far as the tensile stress was concerned the material would have been accepted had the deviation been reported to the Maritime Commission. Mr. Olds also mentioned that since the hearings the Navy Department has changed its specifications for strip mill plates so as to

reduce the minimum tensile strength from 60,000 to 58,000 lbs. per square inch.

"The Irvin Works never was intended to be a plate mill," said Mr. Olds. "It lacked the facilities for cooling and storing plates in the usual plate mill manner. To have added them would have cost enormously and would have delayed conversion of the mill by five or six months. Carnegie-Illinois converted the Irvin Works at its own expense in the course of a few weeks. The Government was very anxious to get as many plates as possible for the increased shipbuilding programs. The Chief of the Bureau of Ships of the Navy on Feb. 24, 1942 (before the Irvin Works was converted) issued instructions which liberalized inspection procedures in the interest of securing increased plate production."

When in some instances the heat number (only an identifying mark)

was lost in the rolling process at Irvin Works, employees assigned an arbitrary heat number and made up a chemical analysis instead of conforming to company rules requiring that slab borings be taken and chemically analyzed, explained Mr. Olds. He said the employees in so acting "cut a corner. What they did was irregular, but the fact remains that there is nothing in the record to indicate that the steel had not all been tested for chemical analysis or was not within the chemical specifications."

Plate production of all mills of Carnegie-Illinois fell off 40,000 tons or 12½ per cent in the four weeks after March 18 as compared to the four preceding weeks, said Mr. Olds. Production at the Irvin Works during approximately the same period was off 28 per cent from the preceding four weeks, and at the converted mill at Gary was off 8½ per cent. Operations at these Irvin and Gary mills are returning toward earlier plate production rates.

(Editor's Note—The tonnage losses cited above are equivalent to about 10 merchant ships of the C-2 type.)

## Canada Reaches A New Phase In War Production; Workers to Be Shifted

### Toronto

• • • C. D. Howe, Minister of munitions and supply, recently stated that Canada has reached one phase of her war production program, but a new phase of definitely accelerated tempo is immediately ahead. The new phase probably will involve extensive movement of men within war industry during the coming months, but there will be no decline in the volume of employment in war industry. The first step in the new program will be the doubling of shifts in all Eastern Canada shipyards. These yards are now operating on only one shift a day compared with three shifts on the Pacific coast.

"All labor laid off in the less important war plants will be quickly absorbed into plants producing ships, planes, radios and telephonic equipment, where a big labor demand exists," he said. "It is just a transition phase through which we are passing."

Early this year Canada reached a new peak in war materials production with an annual rated capacity of \$3,700,000,000, which placed this coun-

try fourth among the United Nations as a producer of war supplies. Of all the thousands of Canadian industrial plants turning out war supplies early this year, only two were making exactly the same war products three years ago.

Before the war the Canadian aircraft industry employed less than 1,000 people to make only a few small single-engined planes and flying boats each year. In 1942, despite a radical changeover to new types and a general expansion and stabilization of the program, aircraft jumped to \$235,000,000 from a coast-to-coast chain of strategically located plants employing more than 83,000 people.

A completely new heavy ordnance industry was built from scratch. Three years ago Canada had not the facilities for making a gun barrel, let alone a gun complete with mountings or carriage.

Still another huge wartime industry has been created for the production of ammunition and explosives. In the heavy ammunition field where Canada is turning out millions of

shells a year together with aerial bombs, land mines, naval mines, and grenades, the manufacture of components alone had jumped to \$227,000,000 in 1942. The manufacture of small arms ammunition has developed to the point where Canada now is turning out over 4000 rounds of machine gun and rifle ammunition every minute. Canadian armor-piercing shot, made from low alloy steel at a quarter of the cost of the high grade tool steel formerly used, has revolutionized this type of projectile. Small arms ammunition expanded to a value of \$41,000,000 for 1942. The manufacture of filling for Canadian ammunition is another huge industry in itself.

Armored fighting vehicles were produced to a value of \$160,000,000 in 1942, an output eight times that of the previous year. Instruments and communication equipment were made in Canadian plants to the value of \$80,000,000 last year.

Canada is not only making vast supplies of munitions and equipment for her own services and for shipment overseas, but is also making a major contribution to the task of transporting those materials abroad. More than 100 cargo vessels of 10,000 tons each have been launched, plus more than 300 naval craft, ranging from patrol boats to corvettes. Ship production and repairs expanded to a dollar value of \$274,000,000 in 1942.

Establishment of a domestic machine tool industry has helped break the machine tool shortage.

In 1942 conservation was applied to war industries as a policy effective from top to bottom. Simplifications were effected to save not only materials, but machine tool capacity and labor as well.

In many instances, the Government has provided manufacturers with new plants and equipment. Where a manufacturer can finance such expenditure himself the war Contracts Depreciation Board may provide for accelerated depreciation in whole or in part. If the contractor is unable to finance the expansion the Government provides machine tools, equipment and buildings, retaining ownership as Crown property. Two methods are followed in the operation of Government owned plants—the Crown Co. method or management-fee system. Under the Crown Co. set-up, a Government owned corporation is formed to operate the plant for Government account. The president and directors of these companies are chosen for their particular knowledge of the op-

### Glimpses of Wartime America

#### Highlights From Opinions Expressed During Past Week

• • • "The .45-cal. sub-machine gun, which before the emergency cost the U. S. \$225 apiece, has been replaced today by equally effective guns which are produced largely from stampings and uncrucial materials and which cost only \$21. . . . .50-cal. aircraft machine guns, which used to cost \$1,000, have now, by redesign, saved 52 lb. of steel, 2 lb. of bronze, and other substantial savings, and the gun is now produced for \$400. . . . 90 mm. anti-aircraft gun mounts, which formerly used 470 lb. of aluminum, now use only 46 lb.; 965 lb. of copper were formerly used, whereas now only 238 lb. are needed, and 47 lb. of tin has been reduced to 22. . . . Tipping of high-speed cutting tools is being encouraged in plants throughout the country in an effort to cut down the wastage of 36,000 tons of 'tippable' tools that are consumed yearly. Widespread adoption of tool tipping practices would mean a saving of some 75 to 90 per cent of the critical alloys used in cutting tools." *William L. Batt, vice-chairman of WPB, before the U. S. Chamber of Commerce, New York.*

• • • "Anything that interferes with jobs (in the post-war period) must be removed . . . in 1940, 46,000,000 were employed with 6,000,000 to 9,000,000 idle; at present about 63,000,000 are employed or in the armed forces. High level employment two years after the war will be 56,000,000 with 2,000,000 remaining in the armed forces. About 10,000,000 more jobs than normal will be required then and they must be productive jobs." *Paul G. Hoffman, president of Studebaker Corp., and chairman of the Committee for Economic Development, before the American Marketing Assn., New York.*

• • • "Labor is producing at from 30 to 40 per cent efficiency . . . my own 'associates' working 12 hr. a day produce at 98 per cent . . . we are saving the government an estimated \$350,000 a day . . . we make a profit of from 25 to 35 per cent on the sales price of the product . . . total sales last year were about \$19,000,000 and profits were about \$8,000,000 . . . taxes took \$6,000,000. . . . I don't know where the hell we're going." *William S. Jack, president of Jack & Heintz, Inc., Cleveland, before the American Marketing Assn., New York.*

• • • "The United Nations had a net loss of nearly 1,000,000 net tons of shipping at the hands of the Axis . . . these figures include all losses not losses from submarine operations . . . records show that submarines alone counted for only about 50 per cent of all merchant vessels sunk by both sides." *U. S. Navy report to the Truman Committee.*

• • • "The armies of our Allies will not be equipped with their capital needs until the end of this year and our own army will not be so equipped until late in 1944. We still have difficulties in providing cargoes for the shipping which is available to us." *Lieut. Gen. Breton B. Somervell before the U. S. Chamber of Commerce, New York.*

• • • "This year ship production will be about 2000 ships or 19,000,000 tons to prepare for an ultimate invasion of Nazi-held territory. Shipyard employment is at the record peak of 1,300,000 but will soon reach 1,500,000 . . . In addition, another 1,000,000 are in plants that feed materials to these shipyards." *Admiral Emory S. Land, chairman, Maritime Commission, before the U. S. Chamber of Commerce, New York.*

erations and usually give their services without charge. Under the management-fee system the plant is operated by a private company which is paid a reasonable fee for its services.

By comparison with war organizations of other countries, the Canadian system is relatively simple. It is headed by the War Committee of the Cabinet, presided over by the Prime Minister, and comprising the ministers of the three armed services, finance, munitions and supply, justice and transport. This committee decides all matters of war policy. The Department of Munitions and Supply,

acting on requisitions from the ministers of the armed services, carries out all procurement for war.

### New Ammunition Plant

*Montreal*

• • • Paul C. Jones, president of Dominion Rubber Co. Ltd., stated that his company has received a contract from the Department of Munitions and Supply to operate a small arms ammunition plant. The new plant, to be known as Dominion Rubber Munitions Ltd., will be located in Eastern Canada and will start production

# GREEN HELP CAN'T MAKE COSTLY WEIGHT ERRORS



● Today's tough production-control job—dealing with new workers, long hours, greater fatigue and wartime speed—has brought more and more demands for TOLEDO PRINTWEIGH...to keep weight records straight...and set the job down right and fast! Adaptable to scores of weighing operations in all types of industries. Write for Bulletin No. 2032. Toledo Scale Company, Toledo, Ohio. Sales and Service in 181 cities.

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**IT PRINTS BIG FIGURES...** unmistakably big...on thick tickets...on large or small sheets...on strips...with extra copies.

**IT'S SIMPLE IN OPERATION!** Prints direct...no complicated mechanism...dependable...operates in as little as 3/5 sec.

**IT'S ACCURATE!** Back of Printweigh are more than 20 years of Toledo Research and Engineering in weight-printing. Printweigh performance has been thoroughly proved throughout industry.

# TOLEDO PRINTWEIGH SCALES

## CANADA

within a few weeks. The plant will be operated under the direction of Brig. D. E. Dewar, director general of small arms ammunition, Department of Munitions and Supply and when completed will be equipped to manufacture cases and bullets, load and test ammunition, and will employ approximately 1000 men and women.

### 64% Iron and Steel Increase

• • • Production of iron and steel and their products in Canada for the year 1941 had a total value of \$1,483,169,765 at factory prices, a gain of 64 per cent over the \$906,103,055 value for 1940, according to Dominion Bureau of Statistics. The number of plants operating in this group in 1941 was 1760 up 23 per cent from the 1433 plants in the year immediately preceding, while the total number of employees engaged in these industries in the year under review totalled 253,701 which was 54 per cent above the 164,325 for 1940.

Production value by industries for 1941 with 1940 figures in brackets follow:

Pig iron, ferro-alloys, steel and rolled products, \$164,566,392 (\$114,598,409); iron castings, \$77,638,652 (\$49,256,398); heating and cooking apparatus, \$25,353,310 (\$20,405,137); boilers, tanks and engines, \$23,008,783 (\$14,865,343); farm implements, \$34,422,202 (\$22,553,459); machinery, \$124,159,341 (\$84,260,652); automobiles, \$279,958,339 (\$189,807,555); automobile parts, \$124,386,867 (\$64,578,624); bicycles, \$3,560,155 (\$2,680,084); aircraft, \$81,367,910 (\$26,567,902); shipbuilding, \$109,326,883 (\$44,690,937); railway rolling stock and parts, \$118,050,141 (\$95,341,712); wire and wire goods, \$42,395,022 (\$32,446,893); sheet metal products, \$95,379,236 (\$64,277,445); hardware, cutlery and tools, \$59,552,315 (\$35,232,992); bridge and structural steel, \$58,355,506 (\$31,230,062); machine shop, \$10,077,765; miscellaneous iron and steel, \$51,500,946 (\$13,000,451).

Distribution of the above production by provinces was as follows: Ontario, \$1,012,500; Quebec, \$291,700,000; Nova Scotia, \$42,700,000; Manitoba, \$33,300,000; British Columbia, \$71,700,000; New Brunswick, \$16,700,000 Saskatchewan, \$6,700,000; Alberta, \$7,600,000 and Prince Edward Island, \$400,000.

### Locomotive Contracts Placed

• • • New business is developing on a broader scale for Canadian rolling stock builders. Large contracts for cars and locomotives recently have been placed, and arrangements have been concluded for providing the necessary plate and other steel materials. Canadian Car & Foundry Co., Montreal, and National Steel Car Corp. Ltd., Hamilton, received a large contract from the Canadian Pacific Railway Co., for cars. Work also is proceeding on large car contracts placed by the Canadian National Railways.

## NEWS OF INDUSTRY

### Washington Directory Of War Agencies

#### Buildings Occupied by the Office for Emergency Management

Locations	Abbreviations
Albee Building 1426 G St NW	Albee Bg
Arcade Pontiac Building 1437 Irving St NW	1437 Irving Nw
Arlington Hotel 1025 Vermont Ave NW	Arlington Hotel
Auditors Building 14th & C Sts SW	Auditors Bg
Barr Building 910 17th St NW	Barr Bg
Barber & Ross Building 11th & G Sts NW	Barber & Ross Bg
Bond Building 14th & New York Ave NW	Bond Bg
Columbian Building 416 5th St NW	Columbian Bg
Commerce Building 14th & Constitution Ave NW	Comm Bg
Commercial Building 1405 G St NW	Commercial Bg
Dumbarton Oaks 1703 32nd St NW	1703 32d Bg
Dupont Circle Building Dupont Circle	Du Cir Bg
Federal Office Building 2nd & D Sts SW	FO Bg
Federal Home Loan Bank Building 101 Indiana Ave NW	FHLB Bg
Fidelity Storage Building 1420 U St NW	1420 U Nw
Fisheries Building 8th & Independence Ave SW	Fisheries Bg
Gas Light Building 1100 H St NW	Wash GL Bg
Georgetown Law School Main Building 431 6th St NW	431 6th Nw
Georgetown Law School Annex 420 5th St NW	420 5th Nw
Interstate Commerce Building 12th & Constitution Ave NW	ICC Bg
Jefferson School 6th & Virginia Ave SW	6th & Va Av Sw
Labor Building 14th & Constitution Ave NW	1437 Dept Bg
LaSalle Building L St & Connecticut Ave NW	LaSalle Bg
Lenox Building 1523 L St NW	Lenox Bg
Library of Congress Annex 2d & Pennsylvania Ave SE	Lib Cong Annex
Munitions Building 19th & Constitution Ave NW	Munitions Bg
National Academy of Science 2101 Constitution Ave NW	21.1 Cons: Av Nw
National Theater Building 1325 E St NW	1325 E Nw
New Municipal Building 300 Indiana Ave NW	New Mnuc Bg
New Post Office Building 1200 Pennsylvania Av NW	New PO Bg
Pentagon Building 703 Columbia Pike Arlington, Virginia	Pentagon Bg
Potomac Park Apartments 21st & C Sts NW	Po Parks Bg
Press Building 14th & F Sts NW	Press Bg
Railroad Retirement Building 3rd & C Sts SW	RR Bg
Raleigh Hotel 12th & Pennsylvania Ave NW	Raleigh Hotel
Social Security Building 4th & Independence Ave SW	SS Bg
Standard Oil Building 2nd & Constitution Ave NW	Stand Oil Bg
State Building 17th & Pennsylvania Ave NW	State Dept Bg
Stewart Building 1012 5th St NW	Stewart Bg
Tower Building 14th & K Sts NW	Tower Bg
Temporary Building "D" 4th & Independence Ave SW	TemD
Temporary Building "E" 4th & Adams Drive SW	TemE
Temporary Building "R" 4th & Jefferson Drive SW	TemR
Temporary Building "S" 8th & Jefferson Drive SW	TemS
Temporary Building "U" 12th & Constitution Ave NW	TemU
Temporary Building "V" 1400 Pennsylvania Ave NW	TemV
Temporary Building No. 2 19th & D Sts NW	Tem2
White House 1600 Pennsylvania Ave NW	White House
Willard Building 513 14th St NW	Willard Bg
2145 C St NW	2145 C Nw
430 Delaware Ave SW	430 Del Av Sw
920 E St NW	920 E Nw
443 Eye St NW	443 Eye Nw
24 H St NE	24 H Ne
1825 H St NW	1825 H Nw
462 Indiana Ave NW	462 Ind Av Nw
470 Indiana Ave NW	470 Ind Av Nw
505 K St NW	505 K Nw
1409 L St NW	1409 L Nw
1531 O St NW	1531 O Nw
1530 P St NW	1530 P Nw
601 Pennsylvania Ave NW	601 Pa Av Nw
1778 Pennsylvania Ave NW	1778 Pa Av Nw
1327 S St NW	1327 S Nw
1612 U St NW	1612 U Nw
433 3rd St NW	433 3d Nw

Guadalcanal Invasion Landing (Official U. S. Navy Photo).  
Roustabout Cranes are hustling war materiel at home and overseas.



FULL BOOM SWING

on heavy ball-bearing turntable, all gears enclosed in oil—ruggedly built for years of overwork.

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**TIRELESS ROUSTABOUTS**  
The Free-Roving Tractor-Footed  
**ROUSTABOUT CRANE**

**T**HIS powerful brute far more than earns his keep around your factory, yard, dock, warehouse or airport. He moves stuff where and when you need it moved—no delays, no taking men from other work. Easy to operate, all tractor power, Roustabout Crane can pick up a bulky load and lay it down as gently as if it were a sleeping baby—or slam 5 tons into a freight car without a grunt. Many hundreds of them on wheels or crawler tracks are doing it today for industrial and transport organizations and our fighting services around the world. For fast action now, for post-war cost cutting, write at once for the facts.

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Keep 'em Flying



**ROUSTABOUT CRANES**

By Hughes-Keenan

Load-Handling Specialists Since 1904

NEWS OF INDUSTRY

# Gangway for Monorails!

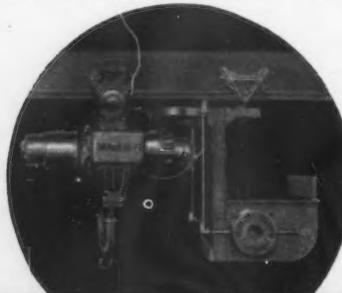
"AERIAL RAILWAYS OF INDUSTRY"



Above: Shepard Niles Cab-Operated Monorail equipped with clamshell bucket. For indoor or outdoor service.

Where speed must team up with accuracy and dependability in handling loads, indoors or out, or both, Shepard Niles Cab-Operated Monorails are proving themselves to be of invaluable assistance in many busy plants. "Just couldn't get along without them," is the way one manufacturer puts it. Let us show you what this equipment will do for you. There is a Shepard Niles representative in or near all war production centers.

*Below:* Shepard Niles Trailer-type Monorail. Furnished with either open or enclosed operator's cab.



Shepard Niles Cupola Charger Monorail for charging cupolas or for general yard handling.

**Shepard Niles**  
CRANE & HOIST CORPORATION

356 SCHUYLER AVE. • MONTOUR FALLS, N.Y.

128—THE IRON AGE, May 6, 1943

220 Canal St SW	220 Canal Sw
1930 10th St NW	1930 10th NW
527 13th St NW	527 13th NW
1509 14th St NW	1509 14th NW
1515 14th St NW	1515 14th NW
1526 14th St NW	1526 14th NW
1529 14th St NW	1529 14th NW
1630 14th St NW	1630 14th NW
2400 16th St NW	2400 16th NW
1111 18th St NW	1111 18th NW
515 22nd St NW	515 22d NW
1253 23rd St NW	1253 23d NW
1242 24th St NW	1242 24th NW

## Various Departments

Liaison Office for Emergency Management  
Liaison Officer Wayne Coy rm252 StateDept Bg

Combined Production and Resources Board  
U S Member of the Board Donald M Nelson  
rm5055 SS Bg

British Member of the Board Oliver Lyttleton  
London

Canadian Member of the Board C D Howe  
Canada  
U S Deputy Charles E Wilson rm5037 SS Bg

Division of Central Administrative Services  
Director Dallas Dort rm220 FHLB Bg

National War Labor Board  
Chairman William H Davis rm5146 Labor Dept Bg  
Vice Chairman George W Taylor rm5146 Labor Dept Bg

Office of Civilian Defense  
Director James M Landis rm1030 Dupont Circle Bg

Office of the Coordinator of Inter-American Affairs  
Coordinator Nelson A Rockefeller rm3898-B Com Bg

Office of Defense Transportation  
Director Joseph B Eastman rm5136 ICC Bg

Division of Material & Equipment Requirements  
Director H H Kelly rm2123 ICC Bg

Water Transport  
Assistant Director in Charge Ernst Holzborn rm5412 ICC Bg

Division of Coastwise and Intercoastal Transport  
Director Charles F Kellers rm5412 ICC Bg

Division of Inland Waterways  
Director Glenn Taylor rm5412 ICC Bg

Division of Great Lakes  
Director A T Wood rm5412 ICC Bg

Division of Motor Transport  
Director John L Rogers rm4211 ICC Bg

Division of Railway Transport  
Director Victor V Boatner rm5139 ICC Bg

Office of Economic Stabilization  
Director James F Byrnes E Wing White House

Office of Lend-Lease  
515 22nd St NW  
Administrator Edward R Stettinius Jr rm521

Petroleum Administration for War  
Administrator Harold L Ickes rm6000 So Interior Bg  
Deputy Administrator Ralph K Davies rm6654 So Interior Bg

Office of Price Administration  
National Price Administrator Prentiss M. Brown rm4130 FO Bgl

NEWS OF INDUSTRY

## Bessemer Steel O.K.'d For Landing Mats

Washington

• • • Landing mats for Army airplane runways hereafter will be made of Bessemer steel which the Bureau of Standards has advised the Corps of Engineers is ideal for that purpose. It was pointed out that Bessemer steel requires only a fraction of one hour in preparation compared with eight or 10 hr. for all other processes.

Executive Assistant A Manning Shaw  
rm4128 FO Bgl

### PRICES

Deputy Administrator in Charge of Prices  
J Kenneth Galbraith rm5131 FO Bgl

Executive Officer for Price

Export Import Price Control Office Director Seymour E Harris rm5120 FO Bgl  
Food Price Division Director Austin C Hoffman rm5207 FO Bgl

Textiles Leather & Apparel Division Director Bernard F Haley rm5305 FO Bgl

Fuel Price Division Director Sumner T Pike rm6306-B FO Bgl

Petroleum Price Branch Executive George W Doffing rm6307 FO Bgl

Solid Fuels Branch Price Executive Gerald B. Gould rm6306-A FO Bgl

Industrial Manufacturing Price Division Director Donald Wallace rm6131 FO Bgl

Chemicals & Drugs Price Branch Price Executive Patrick M Malin rm6132-A FO Bgl

Consumer Durable Goods Price Branch Price Executive Alfred Auerbach rm6134 FO Bgl

Machinery Price Branch Price Executive Thomas J. Kinsella rm6207-A FO Bgl

Rubber Price Branch Price Executive Vacancy

Industrial Materials Price Division Director Clair Wilcox rm2131 FO Bgl

Building Materials Price Branch Price Executive Neil Staebler rm2133 FO Bgl

Iron & Steel Price Branch Price Executive Donald D Kennedy rm2207 FO Bgl

Non-Ferrous Metals Price Branch Price Executive John D. Sumner rm2123 FO Bgl

### Office of Scientific Research and Development

Director Vannevar Bush rm201 1530 P NW  
Executive Asst to Director Carroll Wilson  
rm201-A 1530 P NW

War Manpower Commission  
Chairman Paul V McNutt rm5554 SS Bg

Office of the Executive Director  
Executive Director Lawrence Appleby rm5236 SS Bg

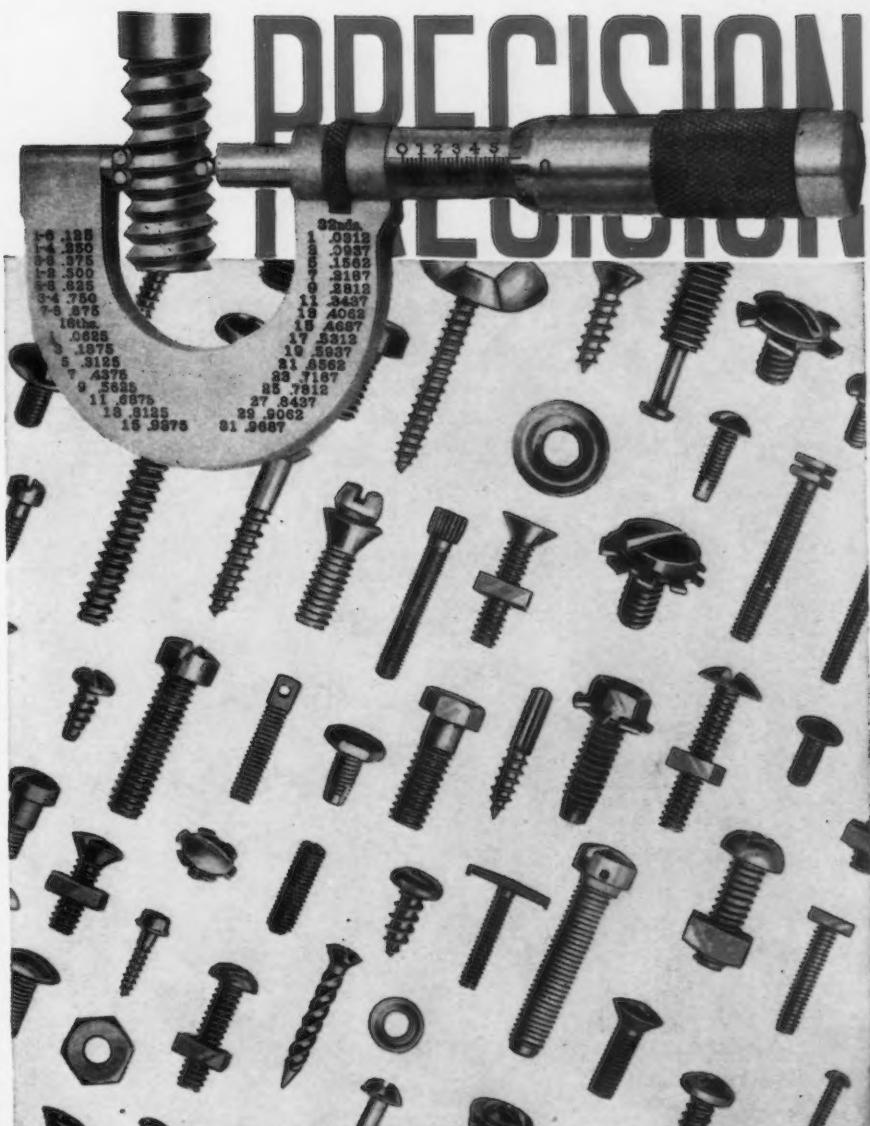
Bureau of Program Planning and Review  
Director William Haber rm5233 SS Bg

Bureau of Selective Service  
Director Lewis B Hershey 21st & C NW

Bureau of Placement  
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The war production requirements for precision in every mass produced unit of assembly are amply met by HOLTITE Screws, Bolts, Nuts and allied fastenings. Produced in great quantity with the uniform precision of small tools, these trouble-free units are gauged and inspected to strict standards of accuracy throughout every stage of manufacture. From metallurgically tested raw materials, through the wire processing mill (in our own plant), to final inspection, HOLTITE fastenings are fabricated by the most precise equipment in the industry.

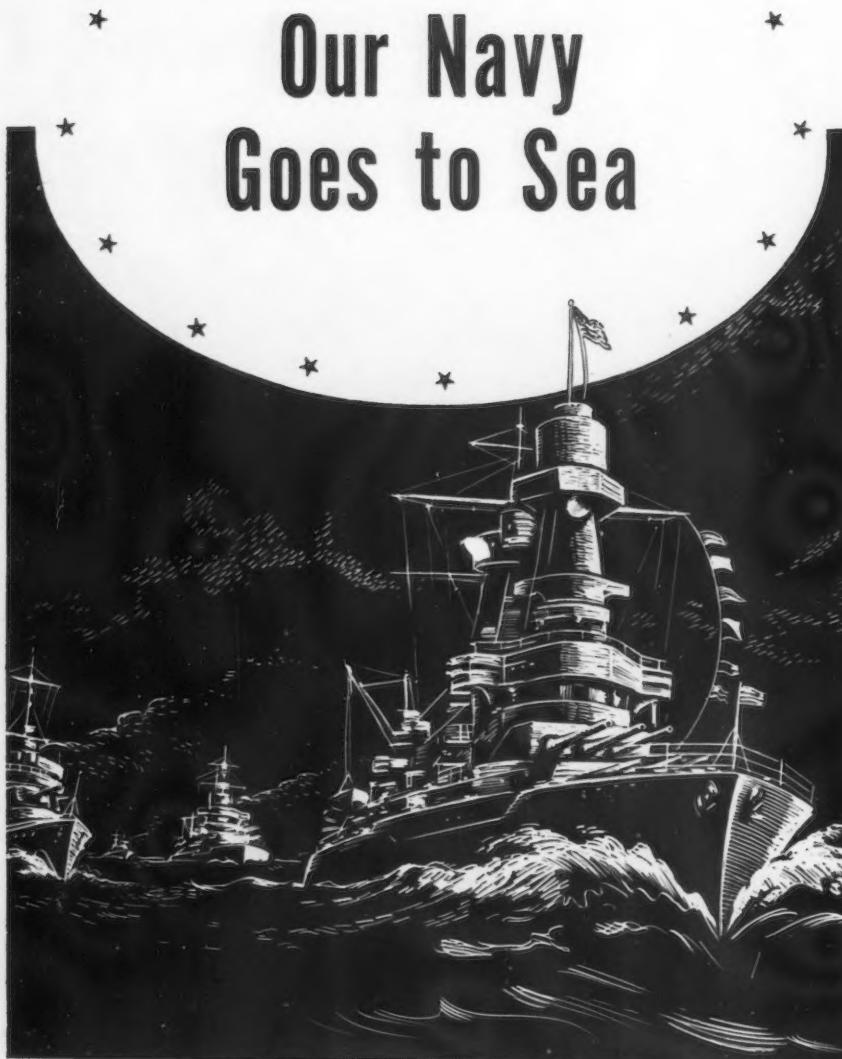
Precision parts effect time-saving, reduce spoilage, and assure enduring, faultless service. Specify HOLTITE on your next order.

### HOLTITE Recessed Head Screws & Bolts

Cutting driving time an average of 50%, these production-boosting screws and bolts can be driven safely by spiral, electric and pneumatic drivers without danger of injury to material or worker.



**CONTINENTAL SCREW CO.** New Bedford, Mass., U.S.A.  
**BUY MORE WAR BONDS**



## WITH FORGINGS by Standard

Seven fleets are now in action . . . attacking . . . convoying . . . protecting. From battleships, cruisers, destroyers and submarines down to escort vessels, mine layers and mine sweepers, Standard steel forgings and castings have helped in putting many of these vessels at sea. Helping to keep them there is the rigidly controlled, dependable high quality found in all Standard steel products. In peace and war, throughout 148 years of our Nation's history, Standard has supplied quality forgings as specified. Not only our armed forces but America's great railroads and industries as well, can attest their worth.



**STANDARD  
STEEL WORKS**

DIVISION OF THE BALDWIN LOCOMOTIVE WORKS  
PHILADELPHIA

FORGINGS • CASTINGS • WELDLESS RINGS • STEEL WHEELS

130—THE IRON AGE, May 6, 1913

### NEWS OF INDUSTRY

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Executive Vice Chairman C E Wilson  
rm5037 SS Bg

Vice Chairman W L Batt rm5055 SS Bg

Assistants to the Chairman  
Sidney J Weinberg rm5403 SS Bg  
A C C Hill Jr rm5036 SS Bg  
E A Locke Jr rm5036 SS Bg

Vice-Chairman on Smaller War Plants  
Corporation Col Robert Johnson rm316  
HOLC Bg

Vice-Chairman for Civilian Requirements  
Arthur D Whiteside rm5415 SS Bg

Executive Vice-Chairman C E Wilson rm5037  
SS Bg

Executive Assistant Col E F Jeffe rm5037  
SS Bg

Administrative Assistant to the Chairman  
Bernard Gladieux rm5013 SS Bg

Office of Organizational Planning Lyle  
Craine Acting Director rm2037 SS Bg

Division of Budget Administration  
Francis R Cawley Budget Director  
rm2006 RR Bg

Division of Personnel Management Carlton  
Hayward Director rm2006 RR Bg

Division of Administrative Services William  
A Murphy Director rm1330  
RR Bg

Division of Information Bruce Catton Director  
rm5525-A SS Bg

Associate Director Charles E Noyes  
rm5525-B SS Bg

Assistant Director Harold R Stone  
rm1760 SS Bg

Aircraft Production Board Charles E Wilson  
Chairman rm5037 SS Bg

Controller of Ship Production William  
Francis Gibbs rm4300 SS Bg

Steel Division Hiland G Batcheller Director  
rm1029 SS Bg

Copper Division Harry O King Director  
rm1085 TemR

Aluminum and Magnesium Division A H  
Bunker Director rm2003 TemR

International Supply Vice-Chairman W L  
Batt rm5055 SS Bg

War Production Drive Headquarters Wm G  
Marshall Director rm1205 Raleigh Hotel  
Labor Production Division Wendell Lund  
Director rm5056 SS Bg

Combined Production and Resources Board  
Arthur B Newhall Executive Director  
rm5707 SS Bg

Stanley Phraner U S Secretary rm5611  
SS Bg

Vice-Chairman Ralph Cordiner rm5027 SS  
Bg

Planning Committee R R Nathan Chair-  
man rm5710 SS Bg

Executive Director Edward T Dickinson  
Jr rm2744 SS Bg

Procurement Policy Division Tudor Bowen  
Acting Director rm4514 SS Bg

Statistics Division Stacy May Director  
rm5700 SS Bg

Associate Director Simon Kuznets rm  
5713 SS Bg

Office of Production Research and Develop-  
ment Harvey N Davis Director 420 5th  
St NW

Assistant Director Harold H Thurlby 420  
5th St NW

Assistant Director Richard A Wolff 420  
5th St NW

Office of Progress Reports Stacy May Di-  
rector rm5700 SS Bg

Associate Director M Joseph Meehan  
rm2609 SS Bg

Resources Protection Board William K  
Frank Chairman rm5121 RR Bg

Facilities Division William B Murphy Di-  
rector rm2607 RR Bg

Facilities Bureau Chas E Volkhardt Direc-  
tor rm4254 SS Bg

Facilities Program Division Esty Foster  
Director rm4242 SS Bg

Construction Division Col F J C Dresser  
Director rm4268 SS Bg

Program Vice-Chairman J A Krug rm5300  
SS Bg

## NEWS OF INDUSTRY

### Pretty Gals Lose Out to Rib Roasts

**Detroit**

• • • Pin-up pictures, traditionally associated with soldiers' barracks, also find places on factory walls, as every manufacturing executive knows—particularly pin-ups of the more revealing variety. In a prominent Detroit plant, however, all the pin-ups disappeared the other day. They were covered over with large and colorful illustrations of steaks, chops and standing rib roasts.

**Requirements Committee** J A Krug Chairman rm5300 SS Bg

**Production Controls Bureau** Harold Boeschenstein Director rm3006 RR Bg

**Controlled Materials Plan Division** Walter C Skuce Director rm3006 RR Bg

**Scheduling Division** Harry Zellman Director rm3018 RR Bg

**Orders & Regulations Bureau** Director to be appointed

**Appeals Board Chairman** A N Holcomb 462 Indiana Ave Nw

**Orders & Regulations Branch Chief** to be appointed

**Program Bureau** John F Fennelly Director rm5311 SS Bg

**Military Division** Bertrand Fox Director rm5316 SS Bg

**Non-Military Division** Melvin G De Chazeau Director rm5315 SS Bg

**Foreign Division** E A Peyser Director rm5330 SS Bg

**Stockriling & Transportation Division** William Y Elliott Director rm2653 SS Bg

**Urgency Rating Division** Blackwell Smith Director rm5324 SS Bg

**Distribution Bureau** Byron Heacock Director rm3038 RR Bg

**Controller Division** David Novick Director rm3062 RR Bg

**Canadian Review Division** Joseph M Tucker Director rm8-319 TemE

**Compliance Division** John Logan Director rmH-203 TemE

**Vice-Chairman for Operations** Donald D Davis rm5006 RR Bg

**Scheduling Officer** John Mohler rm5120 RR Bg

**Materials Officer** Joseph E Adams rm4014 RR Bg

**Orders Officer** J B Walker rm4114 RR Bg

**Program Implementation Officer** John H Martin rm3036 RR Bg

**Deputy Vice-Chairman for Field Operations** Wade T Childress rm5018 RR Bg

**Assistant Deputy Vice-Chairman for Field Operations** James A Folger rm5022 RR Bg

**Deputy Vice-Chairman for Industry Operations** John Hall rm4006 RR Bg

**Assistant Deputy Vice-Chairman for Industry Operations** John P Gregg rm4006 RR Bg

**Government Division** Maury Maverick Director rmH-323 TemE

**Radio and Radar Division** Ray C Ellis Director rm4023 SS Bg

**Shipbuilding Division** Captain J O Gwne Director rm3715 SS Bg

**Concentration Division** Jesse French III Director rm4126 RR Bg

**Conservation Division** Howard Coonley Director 8 FI WGL Bg

**Mineral Resources Coordinating Division** Howard I Young Director rm1106 TemR

**Office of Industry Advisory Committees** Barry T Leithad Director rm3412 SS Bg

**Office of Product Assignments** J F Fowler Jr Director rm2082 RR Bg

**Procedures Division** Herman Director Director rm3229 RR Bg

**Redistribution Division** Col C R Baxter Director rm2132 MC Bg

**Salvage Division** Paul C Cabot Director 10 FI WGL Bg



**doesn't mean neglect  
... even with Bus Duct**

So simple, so sturdy, so soundly engineered is Bus Duct that only a minimum of maintenance is needed. Yet that *minimum* is important.

A thorough inspection and routine service once a year are usually enough to keep Bus Duct at top efficiency. But more frequent attention pays, especially where the system may be subjected to moisture, salt-laden air or corrosive fumes.

Here are some points to watch:

Keep hanger bolts and bus bar connections tight.

See that nothing is left in the duct that does not belong there.

Clean out metallic dust and dirt periodically with an air hose.

Watch for insulation abrasions on cables.

Check plugs for loose fuse clips, defective contacts and faulty cable connections.

Maintenance is a real, if unspectacular contribution to the war effort.

Bus Duct can really "take it." Given ordinary, commonsense care, it will keep on delivering power and light under the heaviest loads, at lowest possible maintenance cost.

**BUY MORE WAR BONDS • SALVAGE ALL SCRAP METAL**

Send for descriptive  
Bulletin No. 427

**BULLDOG**  
**ELECTRIC PRODUCTS CO.**

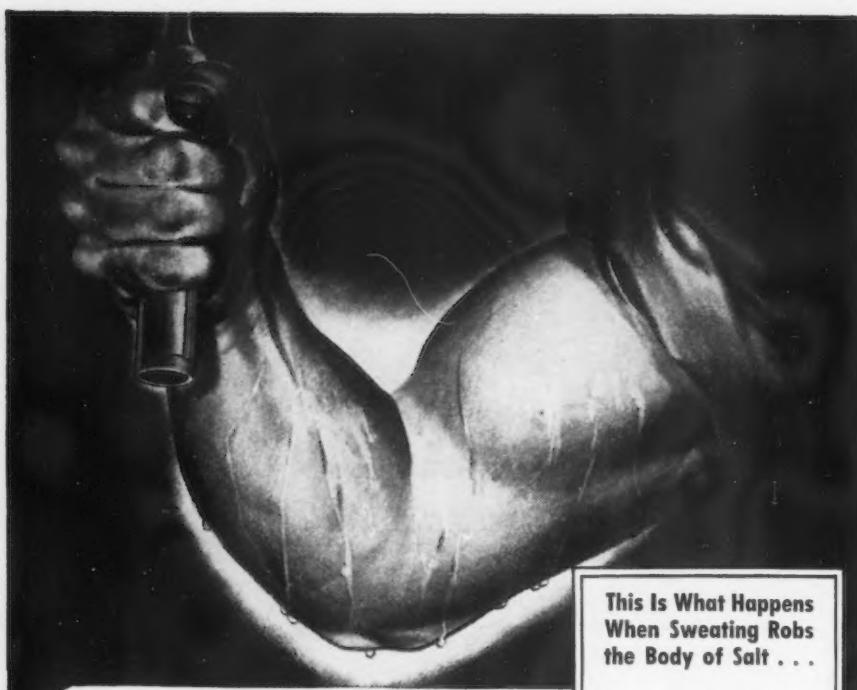
Detroit, Michigan

BullDog Electric Products of  
Canada, Ltd., Toronto, Ontario

Field Engineering Offices  
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MANUFACTURERS OF Vacu-Break Safety Switches, SafeFuse Panelboards, Circuit Master Breakers, Switchboards, Bus Duct Systems — FOR LIGHT AND POWER.



## Keep This Arm On The Job!

Heat-Fag attacks workers who don't replace the body salt lost through sweating. Heat-Fag undermines vitality — destroys the will to work — makes men careless. And, in many cases, it is the direct cause of lost man-hours, absenteeism and accidents.

Heat-Fag is the all-out, unseen enemy of production. Thousands, yes, millions of precious man-hours can be lost through this insidious force that saps men's strength — lowers their efficiency — wears them down before the shift is over. Salt sweated from the body must be replaced — or Heat-Fag takes its toll.

In all leading industrial plants — wherever men sweat and do hot work — salt tablets are a "must".

This Is What Happens  
When Sweating Robs  
the Body of Salt . . .



### QUICK DISSOLVING (Less than 30 seconds)

This is how a Morton Salt Tablet looks when magnified. See how soft and porous it is inside. When swallowed with a drink of water, it dissolves in less than 30 seconds.

Case of 9000, 10-grain Salt Tablets, \$2.60  
Salt-Dextrose Tablets case of 9000, \$3.15

Order from your distributor or directly from this advertisement . . . Write for free folder.

Place  
MORTON'S DISPENSERS  
at all Drinking Fountains.

They deliver salt tablets,  
one at a time, quickly,  
cleanly — no waste. Sanitary,  
easily filled, durable.

500 Tablet size - \$3.25  
1000 Tablet size - \$4.00



MORTON SALT COMPANY • CHICAGO, ILLINOIS

## NEWS OF INDUSTRY

Commodities Bureau H D Huges Director rm2003 TemS

Chemicals Division Dr D P Morgan Director rm1007 TemS

Containers Divisions R C Mower Director rmH-139 TemE

Cork Asbestos and Fibrous Glass Division Fred W Gardner Director rm1103 TemS

Printing and Publishing Division William G Chandler Director rm2017 TemS

Pulp and Paper Division Arthur G Wakeman Director rm43 Fisheries Bg

Construction and Utilities Bureau James Auten Director rm4024 RR Bg

Building Materials Division John L Haynes Director rm203 470 Ind. Ave NW

Lumber and Lumber Products Division J Philip Boyd Director rm203 470 Ind Ave NW

Plumbing and Heating Division Joseph F Wilber Director rm610 Steward Bg

Transportation Equipment Division Andrew Stevenson Director rm700 515 22nd NW

Consumers Goods Bureau Lewis S Greenleaf Director rm4110 RR Bg

Beverages and Tobacco Division J B Smiley Director Third Fl Lenox Bg

Consumers Durable Goods Division Dudley P Felt Director rm208 Jefferson Jr High

Service Equipment Division N G Burleigh Director rm721 Stewart Bg

Textile Clothing and Leather Division Frank L Walton Director 421 Stewart Bg

Wholesale and Retail Trade Division John A Hurley Director 41 East 42nd St New York City

Equipment Bureau Harry A Rapelye Director rm2061 TemR

Automotive Division R L Vaniman Director rm4030 RR Bg

Construction Machinery Division M B Garber Director rmH-367 TemE

Farm Machinery Division George Krieger Director rmH-371 TemE

General Industrial Equipment Division W K Frank Director rmH-288 TemE

Safety and Technical Supplies Division Francis M Shields Director rm606 Lenox Bg

Tools Division George H Johnson Director rm5070 RR Bg

Minerals Bureau Howard I Young Director rm1106 TemR

Mica and Graphite Division M H Billings Deputy Director rm1304 TemR

Mining Division A S Knozen Director rm1035 TemR

Miscellaneous Minerals Division R J Lund Director rm1011 TemR

Tin and Lead Division Erwin Vogelsang Director rm2033 TemR

Zinc Division George C Heikes Director rm3-222 TemE

### War Shipping Administration

Administrator E S Land rm4842 Com Bg

Deputy Administrator L W Douglas rm4843 Com Bg

Deputy Administrator H L Vickery rm4836 Com Bg

Deputy Administrator E Macauley rm4858 Com Bg

### Legal Division

General Counsel John Lord O'Brian rm5517 SS Bg

Solicitor of WPB Milton Katz rm5603 SS Bg

### Office of Rubber Director

Director William M Jeffers rm5014 Municipal Bg

Deputy Director Col Bradley Dewey rm5007 Municipal Bg

### Office of War Utilities

Director J A Krug rm5300 SS Bg

Deputy Director Edward Falck rm5312 SS Bg

### General Counsel Herbert S Marks rm2085 TemR

Power Division B J Sickler Director rm2085 TemR

Communications Division Leighton Peebles Director rm2202 NPO

Manufactured Gas Division Alexander Macomber Director rm2630 TemR

Natural Gas Division Director to be appointed

Water Division Arthur Gorman Director rm2077 TemR

# FIVE HEADS are better than one!

**AHEAD WITH ME** because I need a machine that has a great range of conditioning applications for varying types and conditions of work. I can get the number of work cycles needed per unit simply by varying the roll angle!

**AHEAD WITH ME** because I need flexibility and quick adjustment. Through-put speed variation of 50 to 1,000 R. P. M. by changing the roll angularity and by varying the gear arrangement built right into the machine!

**AHEAD WITH ME** because I need a machine that takes up a minimum of floor space . . . and Medart 2 & 2 Universal takes less floor space than any other machine of equal capacity!

**AHEAD WITH ME** because I need simplified operation! A machine with a minimum of working parts and a minimum of maintenance. No universal joints, no bevel gears . . . no separate gear reduction unit!

**AHEAD WITH ME** because I need a machine that can be used on scaled or rusty work pieces. All driving mechanisms on the Medart 2 & 2 Universal are completely enclosed for protection against dirt. A coolant or circulating fluid may therefore be used on the workpiece with absolute safety.

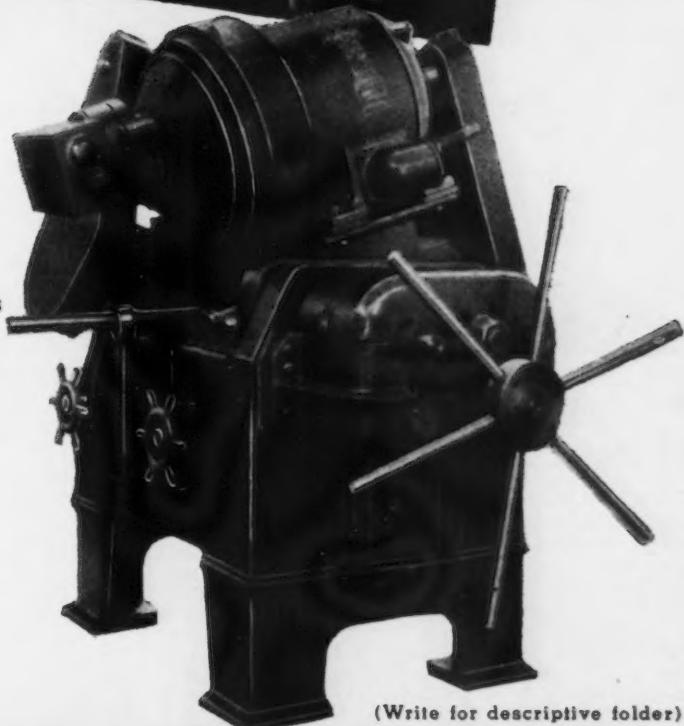
## AHEAD IN FIVE WAYS!

### the new MEDART 2 & 2 UNIVERSAL { 2 ROLLS AND 2 MOTORS

**bar and tube straightening . . .  
sizing . . . polishing machines**

For high speed, precision production...Medart's new 2 & 2 Universal gets the call among bar and tube machines. Similar in operating principle to the Standard Medart 2 Roll Machine, has same patented concave and straight roll arrangement. Difference is, each roll with its individual driving motor and reduction gearing is an integral unit. Work piece ranges 1/16 inch to 6 inches in diameter capacities.

Only Medart presents a complete, proven line of all-purpose bar and tube machines



(Write for descriptive folder)

Manufacturing Engineers of Complete Transmission Equipment and Specialized Machinery

# MEDART

THE MEDART COMPANY  
3500 DE KALB ST., ST. LOUIS, MO.



HEAT-TREATED STEEL SHOT

A shot or grit that will blast fast with a clean finish.

This is the only reason why so many operators are daily changing to our shot and grit, from Maine to California.

The unprecedented demand for our—

## We manufacture shot and grit for endurance

### Heat-Treated Steel Shot and Heat-Treated Steel Grit

has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.



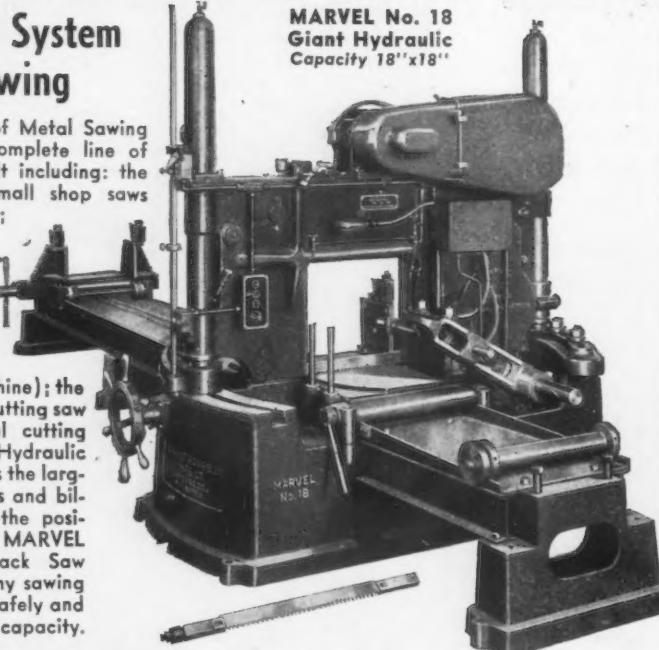
## HARRISON ABRASIVE CORPORATION

Manchester, New Hampshire

HEAT-TREATED STEEL GRIT

## A Complete System of Metal Sawing

The Marvel System of Metal Sawing provides the most complete line of sawing machines built including: the most widely used small shop saws (80% are MARVELS); the fastest high speed hack saws built (automatics that will cut-off identical bars with no more operator attention than an automatic screw machine); the most versatile metal cutting saw—a universal metal cutting band saw). Giant Hydraulic hack saw that handles the largest and toughest bars and billets with ease; and the positively unbreakable MARVEL High-Speed-Edge Hack Saw Blades that permit any sawing machine to operate safely and continuously at full capacity.



MARVEL No. 18  
Giant Hydraulic  
Capacity 18'x18'

## ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave.

Chicago, U. S. A.

Eastern Sales Office  
225 Lafayette St.  
New York

## NEWS OF INDUSTRY

### Milestones

• • • Private industry's record in war production is a fair indication of the capability of business and industry to solve post-war problems for themselves and for the nation, Harold K. Ferguson, president of the H. K. Ferguson Co., industrial engineers and builders of Cleveland and New York, said last week in a message commemorating the 25th anniversary of the founding of his company.

• • • The Ferguson Co. has designed, built and equipped facilities for many different industries. One of Mr. Ferguson's boasts is that "more than 80 per cent of the company's total volume of business has been repeat order business" from a list of prominent clients. A recent achievement was designing and erecting buildings for a large synthetic rubber plant in three-and-a-half months. The company recently was awarded the Army-Navy "E" for its part in designing and building the Rocky Mountain Arsenal.

### AISI Session to Feature Industry's Part in War

• • • Program of the 52nd general meeting of the American Iron and Steel Institute, to be held in New York May 27, will feature addresses at the morning session by Walter S. Tower, president of the Institute; Vice Adm. S. M. Robinson, Office of Procurement and Materials, Navy Department; and Maj. Gen. L. H. Campbell, Jr., Chief of Ordnance, War Department.

The afternoon meeting will be divided into two general sessions—one on technical subjects, the other on industrial relations.

The technical session will be divided into three discussions each with the general theme, "The Steel Industry's Contribution to the War Effort." One part will deal with the expansion program and general production problems; another with steelmaking practices; the third with conservation of critical materials.

At the industrial relations session members of the industrial relations committee will present short papers dealing with several phases of industrial relations activities, including discussion of war manpower problems.

The banquet and evening session again will be omitted because of the war.



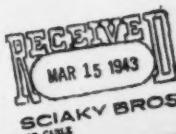
LD285MC (WA 903) GOVT TO  
WUX WASHINGTON DC MAR 13, 1943 818P

EMPLOYEES OF SCIAKY CORP

4912 W. 67TH ST CHGO

ARMY AIR FORCES PILOTS FLYING BELL AIRACOBRA'S YOU HELPED TO MAKE SCORED 38 OUT OF 40 BOMB HITS IN ONE RAID ON JAP INSTALLATIONS DURING THE GUADALCANAL CAMPAIGN. IN THAT ATTACK TRACERS FROM ENEMY ANTI-AIRCRAFT GUNS "STOOD OUT LIKE SOLID STREAMS OF FLAME BUT THE AIRACOBRA'S ROARING DOWN AT MORE THAN 400 MILES AN HOUR PRESENTED DIFFICULT TARGETS" THE REPORT TO THE WAR DEPARTMENT STATED. STRAFING THAT FOLLOWED THE BOMBING "WAS THE MOST BEAUTIFUL PART OF THE WHOLE SHOW" AIRACOBRA PILOTS WERE "ALL OVER ANTI-AIRCRAFT GUNS LIKE A SWARM OF HORNETS BLASTING AWAY WITH MACHINE GUNS AND CANNON. THE ENEMY GUNS WERE SILENCED IN SHORT ORDER" WORKERS IN HUNDREDS OF PLANTS PRODUCING PARTS ACCESSORIES SUB-ASSEMBLIES AND FINISHED AIRACOBRA'S HELPED OUR PILOTS CRUSH THE JAPS IN THAT ATTACK. THE ARMY AIR FORCES ARE PROUD OF EVERY ONE OF YOU WHOSE SKILL AND WORKMANSHIP IN FACTORY OFFICE OR ENGINEERING LABORATORY HAD A PART IN PUTTING THOSE PLANES INTO ACTION

ECHOLS MAJOR GENERAL



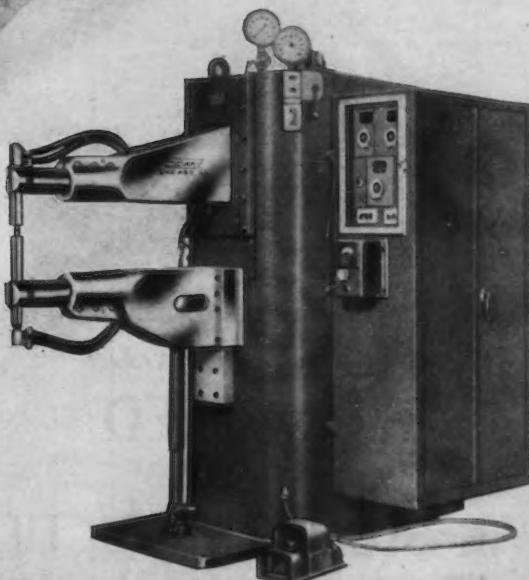
THE QUICKEST, SUREST AND SAFEST WAY TO SEND MONEY IS BY TELEGRAPH OR CABLE

*The Army Air Force Praises  
SCIAKY Skill and Workmanship*  
(Western Union Telegram)

"PILOTS FLYING  
BELL AIRACOBRA'S  
You Helped to Make  
SCORED 38 OUT OF  
40 BOMB HITS"



SCIAKY BROS. salute the gallant and intrepid Army Air Force Pilots . . . and their brilliant work in cleaning up the "Jap-rat" infested Guadalcanal. Sciaky Bros. employees pledge themselves to even greater War effort and to offering every possible assistance to our Armed Force.



Sciaky Type PMCR.2S16  
Electric Resistance Welder,  
welding 70 spots per minute,  
on two sheets of aluminum alloy of .040"  
each. Welding capacity  
from two thicknesses of  
.016" in aluminum alloys  
up to and including .080".

**SCI AKY**  
**PROCESS ELECTRIC  
RESISTANCE WELDING**  
**STORED ENERGY  
WITH PREHEATING**  
**VARIABLE PRESSURE  
WITH PRECOMPRESSION**

SCI AKY BROS.



4915 W. 67th STREET • CHICAGO, ILL.



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## MAINTENANCE MEN HELP SPEED WAR-STEEL PRODUCTION

Crews of maintenance men on the steel front, made up of skilled workers of practically every trade and craft, are keeping all required facilities on the job producing steel for war. Employing every precaution for safety in getting at hot furnace repair jobs quicker, and getting them done faster (illustration shows crew reconditioning soaking pit furnace bottom), these men work in short relays and use powerful airplane-propeller fans to supply them with fresh, cooling air. Maintenance supervisors have their fingers on the pulse of every furnace, mill and machine

**By being prepared  
for any emergency,  
J&L is producing  
more steel for war**



FROM AN ORIGINAL DRAWING BY ORISON MACPHERSON

## CRAFTSMANSHIP

Craftsmen from practically every trade are employed by the steel industry in maintenance and construction work. Bricklayers, boiler makers, carpenters, electricians, pattern makers, pipe fitters, painters, welders, riggers, machinists, millwrights — to name but a few — make up the more than thirty different crafts in steel works.

**Steel operations above 100%** are partially explained by the fact that ingot capacities are based on expected performances after making allowances for operating time lost account of necessary rebuilding and relining of furnaces as well as other essential repairs. When the United States entered the war, the steel industry, employees and management, began to devise every conceivable means to increase production time including the shortening of rebuilding and repair time. The time allowance for rebuilding and repairs has actually been reduced considerably, permitting an increase in operating time, partially accounting for the seemingly anomalous operating rates in excess of 100%. As an example, J&L average operating rate for the year 1942 was 103% of capacity.

**World's worst road** being constructed on contract from War Department by a Baltimore contractor is to be maintained in "most atrocious" condition. The specifications call for simulated shell holes, gaps, dizzy inclines and stretches of broken roadway under water. It is being built at Aberdeen Proving Grounds for field testing Army motorized weapons.

**Electricity from amber.** Some 600 years before Christ, a wise Greek named Thales discovered that amber (*Elektron* in his language), after rubbing, would attract various light-weight objects. In the 16th century Sir Humphrey Gilbert named this mysterious force *vis electrica*. Walter Charleton called it "electricity" in 1650.

**World of electronics** has developed a device that rolls over railroad tracks and sprays white paint on rails if unseen defects are located.

**Sporting arms and ammunition,** after the war, will show some startling improvements, experts predict, that will delight sportsmen and women who like to shoot for game in field and forest or at targets. War-time application of steel for ammunition casings and for jackets (gilded or plain) of all calibers of bullets in order to conserve critical metals, will carry over into field and range at war's end. New firearms for sporting use will likewise come out of the war, due to newer, better steels and the invention of faster, more accurate weapons for our fighting men. With thousands of American sportsmen now selling their shotguns and other weapons to the Federal government for use in guarding war plants, there will be brisk demand for new firearms after the war.

If you ask to see the "boss" on board ship, a sailor will show you the curved portion of the hull around the propeller shaft.

made  
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stration  
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fresh,  
eir fin-  
achine  
in the works. They have tools and replacement parts ready at hand for the emergency when it occurs.

The 650,000 workers in America's steel industry are making the most of every minute to push past their present high rate of production — 85 million tons of steel a year — every ton of it steel to provide our fighting men with equipment, arms and ammunition to crush enemy forces and protect our own.

**JONES & LAUGHLIN STEEL CORPORATION**  
**PITTSBURGH, PENNSYLVANIA**  
**CONTROLLED QUALITY STEEL FOR WAR**

**J&L  
STEEL**

Get the  
right working  
pressure



★ Air operated equipment works best at the correct pressure for each job, and oftentimes the right working pressure is far less than full line pressure. Hannifin pressure regulating valves give you the most efficient working pressure with a turn of the adjusting screw. The exclusive piston-type design means sensitive, accurate control, and full-scale adjustment over the entire range from 150 lbs. down, to furnish any reduced operating pressure desired. Long valve stem travel gives large volumetric capacity, responding to varying operating needs with minimum restriction to flow. Hannifin pressure regulating valves are built in three standard sizes— $\frac{1}{2}$ ,  $\frac{3}{4}$  inch for use with initial compressed air pressures up to 150 lbs. Furnished complete with pressure gauge. Write for Bulletin 56-A.

**HANNIFIN MANUFACTURING COMPANY**  
621-631 S. Kolmar Avenue • Chicago, Illinois

## HANNIFIN Pressure Regulating VALVES

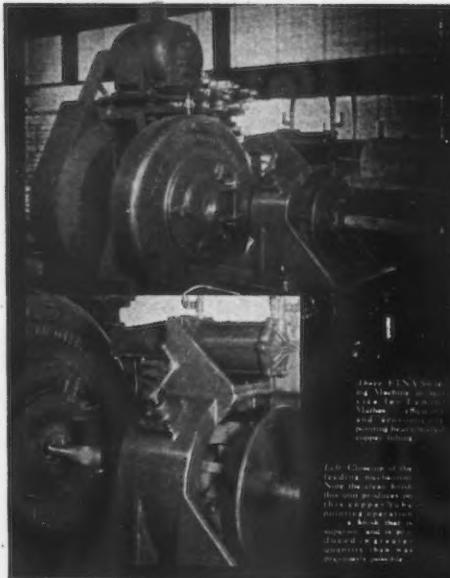
LEWIN-MATHES Got the right answer at

# ETNA

They had a job of pointing heavy-walled copper tubing, and wanted to speed up the operation. Just how to do it didn't appear on the horizon, and so Lewin-Mathes did the safe and logical thing—they put their swaging job up to Etna.

The answer to that problem is illustrated on this page. It's a modern Etna Swaging Machine that points more copper tubes per hour in less time at less cost. If you have a problem involving tapering or reducing tubing and solid rounds—ask Etna about it.

Etna has the swaging machines from  $\frac{3}{8}$ " to 4" and the experience to help you get the most out of this type of machine.



IF IT'S A QUESTION OF TAPERING,  
SIZING OR REDUCING OF ROUND SOLIDS  
OR TUBING...

"Ask ETNA  
About Swaging."

**ETNA**  
MACHINE COMPANY  
TOLEDO OHIO

## FINANCIAL

### Net Billings Rise; But Profit Remains Almost Stationary

New York

• • • An increase in net billings for the first quarter of about \$4,800,000 contrasted with an increase in net income of only \$88,000 over the same period last year, was reported for Bethlehem Steel Corp. last Thursday by E. G. Grace, president, who at the same time announced a voluntary 4 per cent reduction in incentive compensation affecting himself and others of the company's executive staff. Mr. Grace also stated that net billing this year should increase and total around \$2 billion with greatest increases foreseen in shipbuilding contracts.

The company reported net income for the quarter of \$6,228,693 as compared with \$6,140,688 in the first quarter of 1942. Net billings rose from \$305,653,318 in the first quarter of 1942 to \$432,715,168 in first quarter this year while taxes mounted to \$28,880,000 as compared with \$24,190,000.

Grace's participation in the incentive system is reduced by 80 per cent. His salary is reduced from \$180,000 to \$150,000 a year. As compared with a total compensation of \$537,722 which he received in 1941 and 1942 the new rate is equivalent to \$42,544 after Federal income taxes.

In the shipbuilding trade, Mr. Grace observed overtime during 1942 has added \$262 million to payrolls. He said that while the steel industry was not yet smitten, the 48-hr. week, which adds 8 hr. at time and a half, would mean a wage increase of from 8 to 10 per cent and that where overtime was needed in the industry it was being used.

Mr. Grace set Bethlehem's employment at 277,752 for the quarter and at 282,000 at present with 170,000 of these in shipbuilding. Employment in the first quarter of 1942 was 215,922 which rose to 261,432 in the last quarter of that year. Bethlehem shipyards were reported requiring an additional 30,000 men this year which meant a processing and turnover of about 170,000 men due to the draft, training drop-outs and other causes. Total wages for the quarter were \$199,457,000 compared with \$136,015,000 in the same quarter of 1942 and \$186,559,000 in the last quarter.

Mr. Grace defended the Navy's escort destroyer program by saying that



**What we are making today is  
Uncle Sam's business . . . what we make  
tomorrow will be *your* business!**

Today we *fight!* Our strategically located modern factories are driving night and day to hasten victory.

But, even as we fight, we are gaining experience and knowledge which will make for a better America, after this war is over.

Here is a vast reservoir of engineering, metallurgical and mass precision manufacturing skills which all industry has long recognized.

Where infallible precision is an engineering "must" and vital parts must be produced on a quantity

*mass-production* basis—as is so notably the case in the aviation industry just now—Houdaille is a trusted source of supply.

Anticipating the requirements of industry, in war as well as in peace, Houdaille has been one of the pacemakers in this country's engineering and manufacturing progress.

In the post-war world, on land, on sea, in the air, and in your own home—you will benefit increasingly from Houdaille's creative and manufacturing skills.

BUY  
U.S. WAR  
BONDS

**HOUDAILLE-HERSHEY CORPORATION**

General Executive Offices, Detroit, Michigan

PLANTS AT: Buffalo, N.Y. ★ Cheektowaga, N.Y. ★ Jackson, Mich. ★ Detroit, Mich. ★ Chicago, Ill. ★ Decatur, Ill.  
North Chicago, Ill. ★ Muskegon, Mich. ★ Oshawa, Ont., Canada

**HOUDAILLE'S PEACETIME PRODUCTS:** Houdaille Hydraulic Shock Absorbers for Automotive, Railway and Industrial Equipment ★ Bumpers and Grille Guards ★ Ignition Locks ★ Brake Levers ★ Air Cleaners ★ Crankshafts and Camshafts for Aircraft, Automotive and Marine Engines ★ Aircraft Landing Struts and Shimmy Dampers ★ and many other precision-made parts for the Automotive, Aircraft, Electrical Refrigeration, Radio and other industries.

FINANCIAL

# PERFORATED METAL

INDUSTRIAL and

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INDUSTRIAL PERFORATIONS include round, square and special shaped perforations as used in mechanical arts. Our line is comprehensive.

ORNAMENTAL PERFORATIONS as used in architectural grilles, metal furnitures, enclosures, cabinets, stoves and for ornamentation. Many attractive and exclusive patterns.

H & K workmanship is unsurpassed.

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Any Perforation

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*Symbol* OF INTEGRITY

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to War Production

PLATE & WELDING  
DIVISION

PLANT AT SHARON, PA.

Plate and Welding Division  
**GENERAL AMERICAN TRANSPORTATION CORPORATION**  
SHARON, PA.

## "Alphabetitis Finis" or Something Like That

• • • This thing has got to stop somewhere and it might as well stop here. Fedders Mfg. Co., Buffalo, is recruiting WOIFs. A woif in Brooklyn would be a ball 'n chain but in Buffalo its a Woman Ordnance Inspector at Fedders!

he felt the Navy had been unjustly criticized and that foresight had been shown and a good job done. He said "as shipbuilders we ought to know." These ships make up a substantial part of Bethlehem's shipbuilding program.

**Midvale Reports**  
**\$3,730,218 Net Profit**

Philadelphia

• • • The Midvale Co. reported net profit for the 12 months ended March 31 of \$3,730,218 after provisions for taxes and with the post-war credit. This net was declared before renegotiation of contracts. Gross income amounted to \$19,743,818 from which \$15,946,000 was deducted for state and federal taxes. The post-war credit amounted to \$3,797,818. Net profit was equivalent to \$6.22 a share of common stock.

**Contracts Are Increased**  
By Defense Plant Corp.

Washington

• • • Defense Plant Corp., RFC subsidiary, has authorized the following contracts and increases in contracts and in each instance will retain title to the facilities:

Increase in contract with Bell Aircraft Corp., Buffalo, N. Y., to provide additional plant facilities in New York at a cost of approximately \$4,500,000, making a total commitment of more than \$22,000,000.

Increase in contract with Pittsburgh Metallurgical Co., Inc., Niagara Falls, N. Y., to provide additional facilities at a plant in South Carolina at a cost of approximately \$70,000, making a total commitment of more than \$900,000.

Increase in contract with Sylvania Electric Products, Inc., Emporia, Pa., to provide additional facilities at a plant in Pennsylvania at a cost of approximately \$275,000, making a total commitment of more than \$525,000.

Increase in contract with Erie Resistor Corp., Erie, Pa., to provide additional plant facilities in Pennsylvania at a cost of approximately \$100,000, making a total commitment of more than \$400,000.

A contract with Commodity Credit Corp., Washington, D. C., to provide plant facilities in Iowa at a cost of approximately \$350,000.

A contract with the S. K. Wellman Co., Cleveland, to provide equipment for

# *... ALL SET, EXCEPT FOR One Part you CAN'T GET?*



IS progress blocked on your new product . . . is your present war production delayed . . . by one difficult part you can't get? Is it difficult to find equipment to make it fast enough, good enough, to the extreme standards of precision demanded in that part? Should special machinery be designed to make it . . . do you seek a qualified source of supply?

### **Contact KAYDON**

The Kaydon plant is looking for just such problems! Equipped with broad engineering experience and unusual facilities for precision production and technical control, we are qualified to cooperate with your organization in coordinating part design and production methods, to improve use or to speed output. We can make those difficult parts on a high production, low-cost basis, assuring you of the extreme precision, top quality and on-time delivery you demand.

THE **KAYDON** ENGINEERING CORP.

McCRACKEN STREET • MUSKEGON, MICH.

*Specialists in Difficult Manufacturing*

For excellence in production of extremely precise, unusually large ball and roller bearings.



## FINANCIAL

### How many WORDS in a speech?

Usually too many, we think. We're not very long on words here at Dunbar's. Springmaking is our business and we prefer to stick to it. We'd rather show you how your spring may be improved, perhaps at lower cost—or possibly at savings in assembly time. We like to work on new spring developments, too. It's sort of a hobby with us.



*Good spring action speaks louder than words!*

**DUNBAR SPRINGMAKERS**  
SPRINGS WIRE FORMS SMALL STAMPINGS

DUNBAR BROS. CO., Bristol, Conn.  
Division of Associated Spring Corporation

a plant in Ohio at a cost of approximately \$260,000.

Increase in its contract with Hall Gold Mines, Inc., Kershaw, S. C., to provide additional plant facilities in Alabama at a cost of approximately \$30,000, making a total commitment of more than \$200,000.

A contract with Standard Steel Corp., Los Angeles, to provide equipment for a plant in California.

### Inland Income Up Slightly in First Quarter *Chicago*

• • • Inland Steel Co. and subsidiaries reported net profit of \$2,796,321 or \$1.71 a share for the first quarter compared with \$2,683,090 or \$1.65 in the comparable quarter of 1942. Total federal taxes were \$5,100,000 compared with \$6,386,000 in the same quarter last year. A dividend of \$1.00 was voted to capital stockholders payable June 1. Operations for the quarter were reported at 107.4 per cent of capacity compared with 103.4 per cent for the first quarter of 1942 and 102.2 per cent for the whole of 1942.

### Continental Nets

#### \$118,158; Net Sales Drop

• • • Continental Steel Corp., Kokomo, Inc., reports net profit for the first quarter of 1943 of \$118,158, after provision for contingencies and taxes. The sum, after preferred dividends, is equivalent to 50c. a share on common stock outstanding. Net profit of \$169,337 was shown for the corresponding quarter last year.

### Little Change Seen in National Steel Returns

#### Pittsburgh

• • • National Steel Corp. reports net earnings, after all charges, including provisions for depreciation and depletion, interest charges and federal taxes, for the quarter ended March 31, 1943, of \$2,680,850.32, equal to \$1.21 per share on 2,206,267 shares. This compares with net earnings of \$2,675,837.48, equal to \$1.21 per share on 2,205,667 shares, reported in the first quarter of 1942.

### J & L Nets \$2,399,369

#### Pittsburgh

• • • Net profit of Jones and Laughlin Steel Corp. for first quarter of 1943 was reported as \$2,399,369, compared with \$2,491,718 in first quarter of 1942.

**HOLD**  
*Your customers*

By recommending and selling them a Bolt, Screw, or Nut that possesses that EXTRA quality—the quality that is responsible for Clark's 89 YEARS of uninterrupted service and satisfaction to its customers.

Ask for

**CLARK**

**NUTS · BOLTS · SCREWS**

**CLARK BROS BOLT CO.**  
MILLDALE, CONN.



# PLANATHREADING

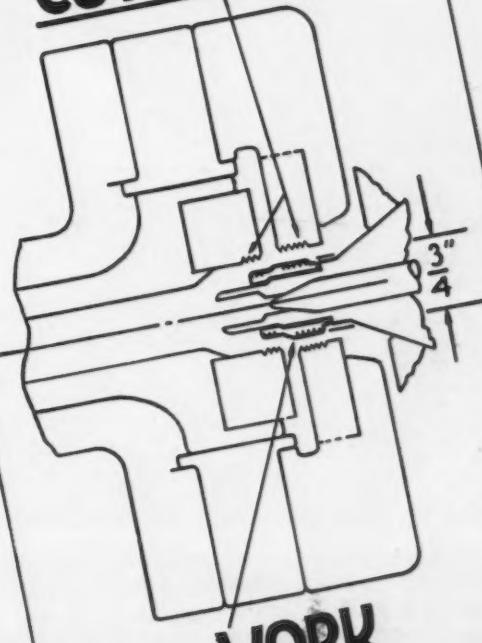
Two external precision threads of different pitch diameters are required to be cut on the work pieces here illustrated.

Both threads are cut simultaneously.

THE TIME  
IS 20 SECONDS!

Let Planathreading speed up your precision threading jobs—either external or internal.

CUTTERS



WORK



HALL PLANETARY CO.  
FOX & ABBOTSFORD AVE., PHILADELPHIA, PA.



# LEE Quality Springs

ALL SHAPES • ALL SIZES • ALL MATERIALS



LEE SPRING COMPANY, Inc.  
30 MAIN STREET

BROOKLYN, N.Y.

LEE-BUILT  
TRADE  
MARK  
SPRINGS

## Super-Sterling METAL CUTTING SAWS

*They don't scratch, they cut!*



### SHATTER-PROOF

#### High Speed Hand Blades

Here's a blade that's really safe. Barked knuckles—an injured face from flying steel—Super-Sterling Flexibles have conquered these hazards.

#### And More

There is dollar saving in Super-Sterling. The full cutting life of every blade is assured. Every Super-Sterling Flexible is guaranteed against breakage.

#### Be Convinced!

Place a trial order with your Mill Supply distributor, or write Dept. A.

DIAMOND SAW WORKS, INC.  
BUFFALO, N.Y.

### Is This What Modern War Plant Must Have?

• • • To help women war workers and reduce absenteeism, Anna M. Rosenberg, Region II director of the WMC, has gone on record as suggesting that grocery stores be established in war plants so that munitions-making housewives can buy groceries without cutting into their working or sleeping time. Jack & Heintz, Inc., Cleveland, originators of "associates" (instead of workers), steam baths and hot and cold running feet for workers, please take notice of a competitor.

### Inland Income Up Slightly Over 1942 Quarter

Chicago

• • • Inland Steel Co. averaged ingot production of 107.4 per cent of capacity in the first quarter of this year, Edward L. Ryerson, chairman of the board, reported last week at a stockholders' meeting. Production in the comparable period of 1942 was 103. per cent and for the year 1942 was 102.3 per cent.

Net earnings of the company in the first quarter were reported at \$2,796,321, equal to \$1.71 per share, as compared with \$2,689,090 or \$1.65 a share in the first quarter of 1942. Earnings before federal taxes were \$7,896,321 for the first three months of this year, as against \$9,075,090 in the comparable period of 1942. The 1943 earnings do not reflect a proportion of the \$2,000,000 set aside for provisions for post-war and other adjustments.

Wilfred Sykes, president of the steel company, reported at the meeting that the two new blast furnaces being built by Inland will be ready for operation in July, barring further delays.

Sykes also reported that the company had produced 312,425 tons of ingots in March, a new record output.

### Youngstown Reports Profit Of \$2,147,023 for Quarter

Youngstown

• • • Youngstown Sheet & Tube Co. and subsidiaries report gross income of \$12,690,277 for the first quarter of 1943. After deduction of \$6,761,000 provided for estimated Federal taxes on income, profit for the period amounts to \$2,147,023, subject to provisions of the Renegotiation Act. Profit for the first quarter of 1942 totaled \$2,576,579.

# HERE'S HELP!

In Training Crane Operators

TELLS HOW  
and  
SHOWS HOW  
to operate  
efficiently

How To  
**OPERATE**  
A Crane



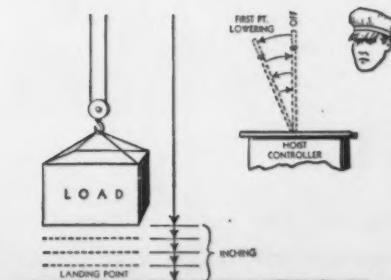
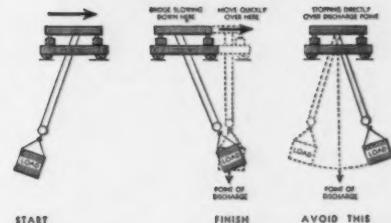
The  
first  
Crane  
MANUAL  
ON OPERATION  
ever published

Your copy is free! A simply written, easily understood 48-page Manual. 70 illustrations—two colors—handy, pocket size.

Contents include safety rules—operating hints—inspection-guide for daily report on condition of crane, suggestions on how to avoid trouble, etc. Explains and pictures what not to do as well as how to get more production safely.

Applies to direct current overhead cranes—all makes. Useful in training new operators—including women—also beneficial for the more seasoned operator. Send for your copy to-day. Ask for Booklet 920—"How to Operate a Crane."

Typical illustrations  
from the MANUAL



THE ELECTRIC CONTROLLER & MFG. CO.  
CLEVELAND OHIO



## U. S. Steel Net Down 38 Per Cent

### New York

• • • Irving S. Olds, chairman of the board, addressing the annual meeting of stockholders of United States Steel Corp. on Monday reviewed the financial condition of the corporation and touched on employment and production levels.

United States Steel's production of rolled and finished steel during 1942 was again in excess of rated capacity.

Ingot production of 30,029,950 net tons in 1942 was 28 per cent larger than in 1941, the highest ingot production during World War I.

Net income of the Corporation for 1942 was \$71,818,569, as compared with \$116,171,075 for the preceding year. Increases in wages and salaries (about \$23,000,000 of which resulted directly or indirectly from directives of the National War Labor Board).

increases in total tax provisions, and other increased costs and charges, reduced the net income of the Corporation for 1942 to an amount 38 per cent below that for 1941.

Dividends on the preferred and common stocks paid for 1942 were at the same rates and in the same dollar amounts as for the preceding year. The balance out of 1942 earnings carried forward for the future needs of the Corporation was \$11,785,884, as contrasted with \$56,138,390 in 1941—a decrease of approximately \$44,350,000, or 78 per cent.

Employment costs increased in 1942 to the extent of 25 per cent above 1941. Federal, State and local taxes in 1942 were 21 per cent greater than in the preceding year.

"If there are to be material increases in employment costs or in taxes in the future, these increased charges can only be met by absorbing in part or in whole the returns to the stockholders and the balance for future needs, or by increasing the prices of steel products," Mr. Olds said.

### Alan Wood Nets \$174,786 In First Quarter of Year

*Conshohocken, Pa.*

• • • Net sales and operating revenue of the Alan Wood Steel Co. and its subsidiaries for the first quarter of 1943 rose to \$7,547,113 from the \$7,328,141 reported for the similar period last year. Net income during the 1943 period was \$174,786 after provision of \$356,000 for estimated federal and state income and excess profits taxes, as compared with net income of \$217,040 and provision of \$520,000 for taxes in the first quarter of 1942.

Cumulative dividends on preferred stock are in arrears \$45.75 per share and aggregate \$3,285,948 on 71,824 shares outstanding at March 31, 1943. A dividend paid March 20 on 7 per cent cumulative preferred amounted to \$1.75 per share.

### Wabana Iron Mines of Dominion Steel May Open *Toronto*

• • • According to a report from Newfoundland, Dominion Steel & Coal Corp. Ltd., will resume partial operations soon at its iron mines at Wabana, which were closed down early this year because of full stockpiles. It is stated that three of the mines will be put in production on a four-day-a-week basis, to provide iron ore for the Sydney steel works.

**CLEANLINESS  
AT WAR • • •**

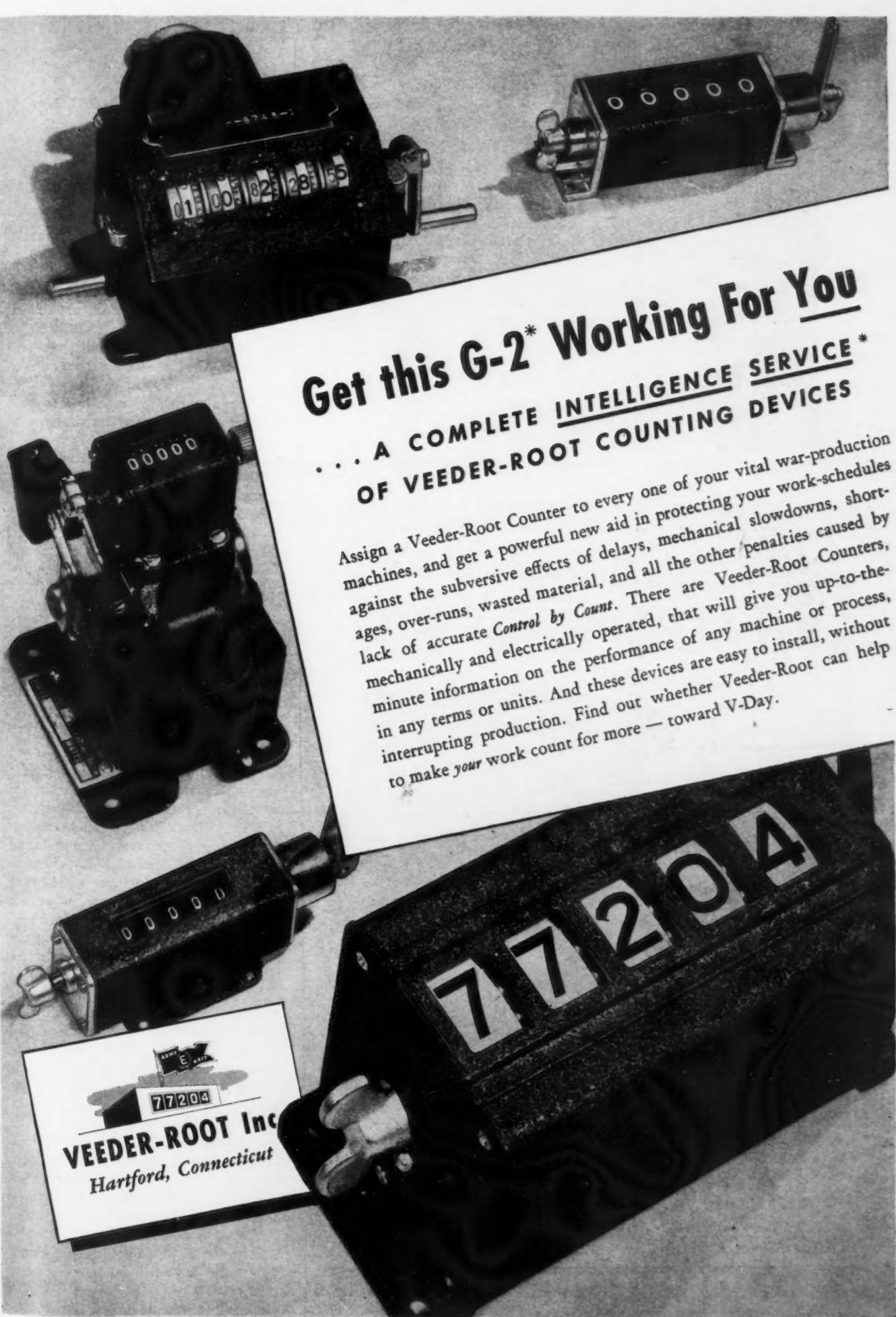
You can't get full lighting efficiency with dirty walls and ceilings — and dust coming down on men, machines, materials and finished goods, slows up production.

In these days of quantity production, precision performance, and rigid inspection, Spencer Vacuum is being used more than ever before.

Many plants that try out the 1½ horse power unit shown, later go to the 7½ HP or a stationary system. A full line of Spencer Vacuum hose and tools meets every condition in industry. It's ideal for bench cleaning and final cleaning of heavy equipment such as planes, tanks, and jeeps.

Inexperienced men or women can use the Spencer with speed and efficiency. Ask for the bulletins.

**SPENCER VACUUM  
CLEANING**  
THE SPENCER TURBINE COMPANY, HARTFORD, CONN.



## Get this G-2\* Working For You

... A COMPLETE INTELLIGENCE SERVICE\*  
OF VEEDER-ROOT COUNTING DEVICES

Assign a Veeder-Root Counter to every one of your vital war-production machines, and get a powerful new aid in protecting your work-schedules against the subversive effects of delays, mechanical slowdowns, shortages, over-runs, wasted material, and all the other penalties caused by lack of accurate Control by Count. There are Veeder-Root Counters, mechanically and electrically operated, that will give you up-to-the-minute information on the performance of any machine or process, in any terms or units. And these devices are easy to install, without interrupting production. Find out whether Veeder-Root can help to make your work count for more — toward V-Day.

VEEDER-ROOT Inc.  
Hartford, Connecticut  
ARMY NAVY  
77204

★ FEATURE CONTINUATION

**War Problems  
Dominate Conference**

(CONCLUDED FROM PAGE 76)

(1) Chromium content in the bath increases in proportion to the amount of hot metal added to the open hearth bath.

(2) In most cases where there is no hot metal addition, chromium content in the basic open hearth steel bath decreases because of oxidation.

(3) Copper, which does not oxidize as readily as chromium usually shows an increase with an addition of hot metal to the basic open hearth steel bath.

Over a period of months the residuals in steel due to the charge and additions in the furnace show a uniform average. By the spectrographic method five elements can be reported in approximately 30 min. after the sample is received, according to Mr. Motock.

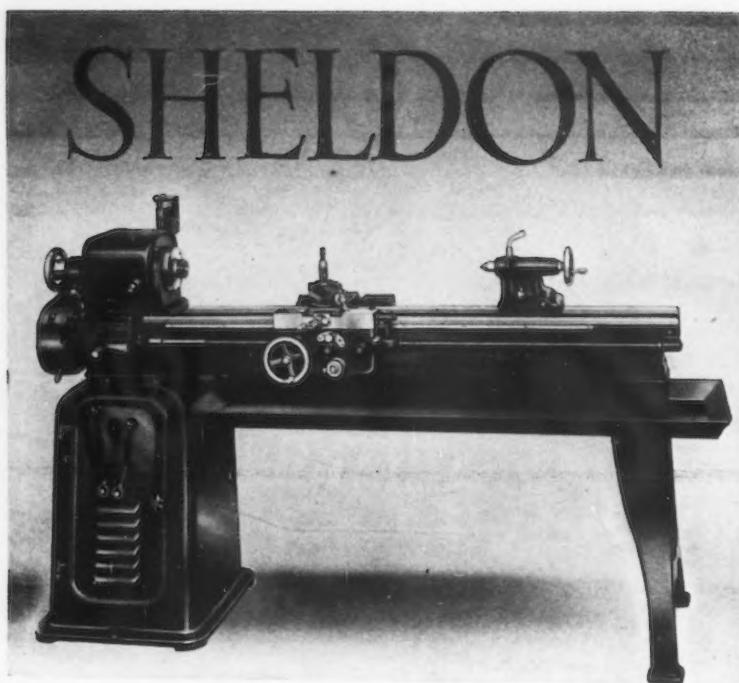
One of the most difficult problems and perhaps one of the most satisfactorily solved has been that of sampling. For spectrographic analysis the sampling unit should be as follows:

- (1) Durable.
- (2) Inexpensive.
- (3) Adaptable to both pouring platform and open hearth floor.
- (4) Produce solid, long pins of minimum diameter.

The sampling unit finally chosen was the result of four months' work, during which time from one to four persons were working on this development. The procedure is very simple and this has enhanced its success. Primarily the procedure consists of compressing a rubber bulb, inserting the tip of the glass tube into a killed molten steel sample, and releasing the bulb, thus sucking the molten steel up into the glass tube.

Samples have been taken for several months by this method, with an experienced person seldom unable to get a good one. When the sampling was turned over to a group of unskilled workmen on the pouring platform, very little instruction was needed. They were able to secure samples more easily than by any of the previous methods tried, so that they now prefer the tube method. Several second helpers have also taken samples and become quite proficient. One demonstration usually overcomes the psychological objection of drawing molten steel into a pyrex glass tube.

It has been found necessary to kill



**BBU-1240 WQ  
PRECISION LATHE**

This quality 12 in. ball bearing tool room lathe is built for precision work and will retain its accuracy under long and hard usage. It has extra collet capacity (to 1" round), the finest precision ball or roller bearings obtainable, an improved heavy-duty, double wall apron with power cross feed; full quick change gears and full bowl headstock. Its improved Sheldon 4-speed,

V-belt, lever-clutch operated, underneath motor drive is entirely enclosed in the pedestal leg and has antifriction bearings. It is so designed that spindle belts operate thru a standard 1-piece bed. This bed is bridge-braced with heavy cross girds and has hand scraped ways—2 V-ways and 2 flat ways.

If interested in 10", 11" and 12" quality lathes be sure to see the SHELDON.

**SHELDON MACHINE CO., INC.**  
1240 N. Knox Ave. Chicago, U.S.A. ★

**Useful  
Facts  
to help you select  
Traveling  
Cranes...**



This new 16-page booklet can give you useful information about crane trolleys, end trucks, driving units, gear cases, cabs and lower blocks. "The WHY and HOW of Faster Production At Less Cost" shows Reading Traveling Cranes at work in plants like yours. It shows how they are helping to speed output and reduce maintenance troubles.

Ask for your copy of this booklet. A note on your company letterhead will start your copy on its way, at no obligation, of course.

Reading Chain & Block Corporation, 2101 Adams St., Reading, Pa.

**READING** CHAIN HOISTS·ELECTRIC HOISTS  
OVERHEAD TRAVELING CRANES

# NO EXPERIENCE NEEDED

*Operator-Skill is built into*

## AMERICAN PHILLIPS SCREWS

If screw driving is a part of your assembly work . . . and you have to take on inexperienced help . . . then American Phillips Screw Driving is definitely for you. Unskilled workers quickly gain confidence from the secure fit of the 4-winged driver in the tapered recess of the screw head . . . making easy, fast, straightline driving practically automatic right from the start. Screw and driver become one solid unit . . . can't wobble . . . can't twist apart. Screw is turned up tight and plumb-level, making a clean, good-looking fastening that any worker would be proud of, and any inspector would pass.

If your war production is being held back by slow, tiring, slip-and-slash driving with slotted head screws, then change now to American Phillips and get faster assemblies at a much lower cost.

**AMERICAN SCREW COMPANY**  
PROVIDENCE, RHODE ISLAND

Chicago: 589 E. Illinois Street Detroit: 5-267 General Motors Building

4-WINGED DRIVER AND PHILLIPS RECESSED-HEAD SCREW  
CAN'T DRIVE ANY WAY BUT STRAIGHT



1. Fast Starting—Driver point automatically centers in the recess . . . fits snugly. Screw and driver "become one unit." Fumbling, wobbly starts are eliminated.



2. Faster Driving—Spiral and power driving are made practical. Driver won't slip out of recess to injure workers or spoil material. (Average time saving is 50%.)



3. Better Fastenings—Screws are set up uniformly tight, without burring or breaking heads. A stronger, neater job results and there are no gouges on work-surface.

*check-*  
*Mr. Webster*

## "SUPERIOR-

EXTREMELY EXCELLENT  
OF ITS KIND; SURPAS-  
SINGLY GOOD . . ."

CHECK  
HOT AND  
COLD ROLLED  
STRIP STEEL

CHECK  
CARBON AND  
ALLOY . . .

CHECK  
STAINLESS  
and  
SUVEENEER  
CLAD METAL

YOUR INQUIRIES ARE INVITED

SUPERIOR  
STEEL CORPORATION  
CARNEGIE, PENNA.

### FEATURE CONTINUATION

all steel before sampling to prevent inferior quality pins. Unfortunately, some of the aluminum now in use has a higher copper content which affects the result, especially aluminum shot. Stick or wire aluminum is satisfactory. Several substitutes have been tried with success.

The analysis of ferro-silicon shows very low percentages of nickel, copper, tin, molybdenum, which, if present, will interfere with the spectrographic analysis for these elements. If ferrosilicon is specified for killing all spectrographic tests, contamination from aluminum, nickel, copper, tin, and molybdenum can be eliminated.

A study of the sample has not shown any contamination from the glass tube. This statement is confirmed by the following:

- (1) Spectrographic check on 40 samples for increased silicon content. None was found.
- (2) Glass tube unmelted even when covered by metal.
- (3) Sample appearance smooth and did not adhere to glass tube.

A logical time for sampling is the period immediately after the melt down when the stirring action of the lime boil makes the bath uniform. There is very little discrepancy between the chemical laboratory analysis and the spectrographic analysis at the preliminary stage. The spectrograph shows, however, a slight increase in the copper content at the time of tap. This is not usually reported by the chemical laboratory. This rise in copper content:

(1) Has been in existence for some time, but has just been brought to prominence by several conditions, including the high sensitivity of the spectrograph.

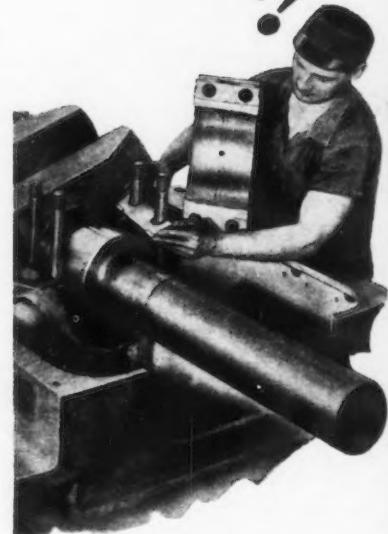
(2) Is due to unmelted scrap in the melt at the time of the preliminary sampling.

(3) Comes from contamination from other additions charged to the bath.

Regarding the application of the spectrograph at Gary Works, A. D. Beers of Carnegie-Illinois reported on data prepared by E. G. Hill, the latter being unable to be present at the meeting.

In April 1942 Gary Works installed a quartz Hilger spectrograph of the Littrow type. When assembly was completed, the calibration curves were worked out for one element at a time; the alloying elements such as copper, nickel, chromium, molybdenum, vanadium, titanium and tin were given preference for two reasons: these

**pressure-  
proof!**



**C**ONSERVE machine efficiency! *Babbitt-tipped* Laminum shims, for pressure-lubricated systems, prevent oil and pressure losses. Body of shim retains all Laminum features of quick precision adjustment by peeling . . . in factory assembly or field service. The .003 or .002 in. laminations are bonded into a solid unit . . . easy to peel.

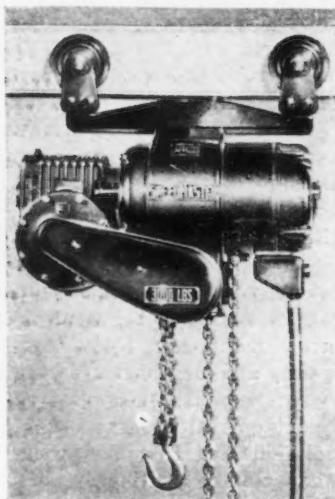
*Laminum shims are cut to your specifications. For repairs or maintenance, get stock shim materials from mill supply dealers. (Write us for illustrated shim application file-folder and Laminum sample.)*

**Laminated Shim Company**  
Incorporated  
76 Union Street Glenbrook, Conn.



*it's*  
**LAMINUM**  
THE SOLID SHIM THAT *peels* FOR ADJUSTMENT

## SPEEDMASTER THE FAST, RUGGED HOIST FOR STEADY WARTIME SERVICE



**Here's why**—Few moving parts plus simple design keep Speedmaster maintenance down. With sturdy construction, Master gear head motor, worm gear bathed in oil, antifriction bearings throughout, the Speedmaster is built to take tough wartime service. Speedmaster runs fast, stops quick and holds tight. Fourteen models and speeds to 60 feet per minute to meet a wide range of application.

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### FEATURE CONTINUATION

elements require a longer period of time for chemical analysis and since the alloy preliminaries from the open hearth are always rush, it was desired to reduce the analysis time on them by analyzing them spectrographically. When these curves were completed to cover the popular alloy ranges, curves were set up for manganese and silicon in steel and pig iron. A few miscellaneous elements such as aluminum, lead and tin, which require lengthy chemical determinations, were also plotted. The following percentage figures represent the maximum that can be interpreted from ranges of present curves and above which it is necessary for the chemists to perform the analyses: copper 0.40, nickel 0.50, chromium 1.00, molybdenum 0.40, vanadium 0.50, titanium 0.05, tin 0.30, silicon in steel 0.35, manganese in steel 0.50, silicon in pig iron 2.00, manganese in pig iron 2.00.

Carnegie-Illinois is constantly working on new curves as well as broadening the ranges on already established curves, this in addition to regular production from the instrument.

A plate is developed approximately every 15 min., with some five samples on a plate. Considering four elements as average, it is possible to complete 20 determinations at 15-min. intervals.

During a recent month this spectrograph produced over 18,000 determinations, which will be increased in the future as our curves are extended to cover larger ranges and as new elements are charted. The instrument is operated 24 hr. a day by three and sometimes four persons per turn.

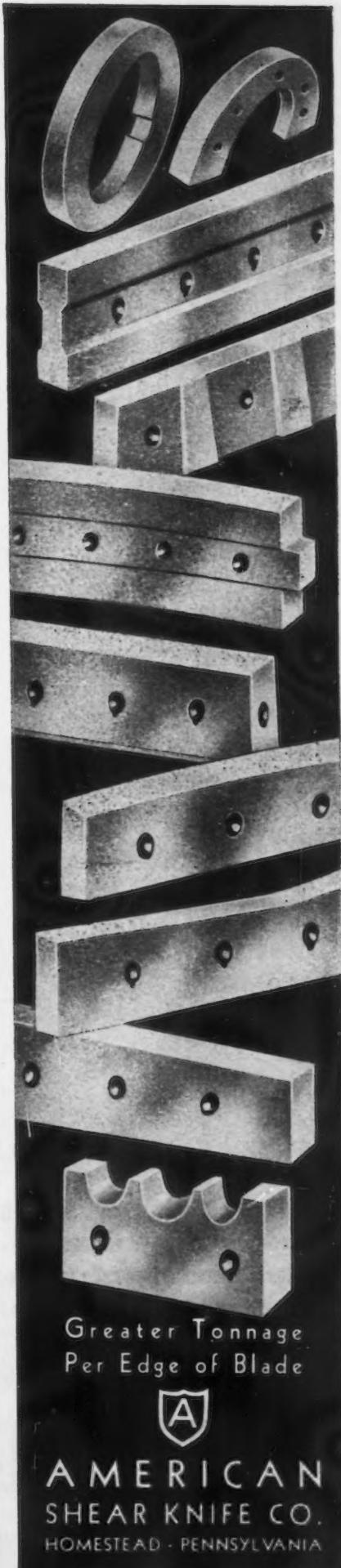
Pig iron samples and open hearth preliminaries are submitted to the spectrograph room as poured pins which are used as electrodes, but ladle steel samples are submitted as drillings, since the chemists use drillings from the same sample for chemical analysis which the spectrograph cannot handle.

According to Mr. Beers, the instrument is proving of great value for qualitative analysis where unusual elements are present, resulting in enormous savings of chemical search.

### Chicago Factory Facilities \$58 Million in Four Months

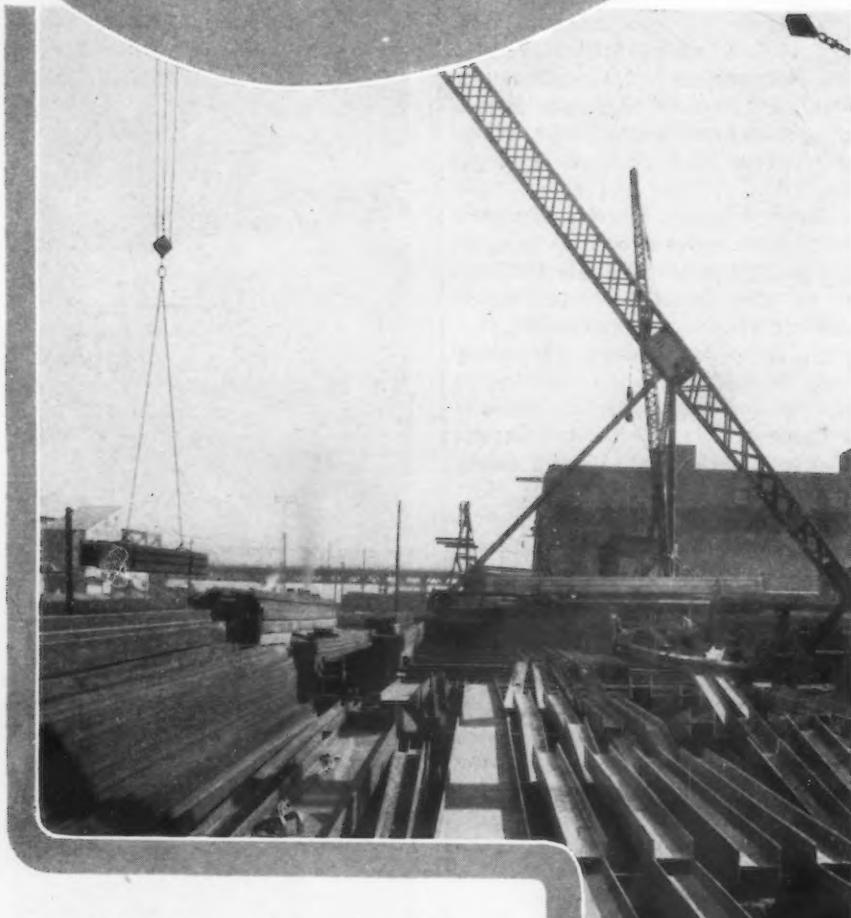
*Chicago*

• • • Including new contracts valued at \$8,341,787 undertaken during April, the Chicago area in the first four months of 1943 has increased its factory facilities by \$58,219,937.



# LEVINSON

## Warehouse STEEL PRODUCTS



**Hot Rolled Sheets, Strip, Flats, Bands, Rounds, Squares, Hexagons; Bar-Sized Angles, Channels, Zees, Tees; Structural Angles, Beams, Channels; Plates and Checker Plates; Reinforcing Bars; APS Protected Steel Roofing and Siding.**



## LEVINSON STEEL SALES CO.

*Warehouse and Specialty Steel Products*

33 PRIDE STREET • PITTSBURGH, PA.

### NEWS OF INDUSTRY

#### Foundrymen Told of Ordnance Cut-backs

##### St. Louis

• • • More than 90 per cent of prime contractors holding Army ordnance contracts are now operating, of necessity, below capacity because of recent cut-backs in ordnance contracts, Col. Merle H. Davis, St. Louis ordnance district chief, said here last Wednesday in an address at the opening meeting of the annual American Foundrymen's Association.

Revealing for the first time the extent of the cut-backs, Col. Davis said that most of the prime contractors are now operating below ultimate capacity, many are below contracted capacity and a number are even below the rate of operations necessary for efficient operation. The ordnance official indicated that this trend could be expected to continue.

Despite an excess of production in some items, Col. Davis stressed that shortages still exist in aircraft and ship production. Col. Davis attributed the over-production to the fact that industry has far exceeded anticipated production of military items. "Army ordnance overshot its mark," he said. "It is obtaining production that was never visualized. It did not reckon on the versatility of a metals industry just out of an industrial depression. For 20 years, the ordnance department has gone under the assumption that industrial conversion would be the limiting factor in waging a major war. It under-estimated both its own efforts and those of industry."

Possibility that adjustment of cancelled contracts arising from the ending of the war will follow the procedure now employed in handling the renegotiation of ordnance contracts was advanced by speakers at a session on foundry costs.

#### WPB Halts Two Railways' Plans for Track Extension

• • • Track extension work planned by the Atchison, Topeka & Santa Fe Railway and the New York, New Haven & Hartford Railroad was halted April 29 by WPB. The Santa Fe project called for track extension and siding between Richmond and Point Isabel, near Albany, Cal. It was to provide rail service to a proposed shipyard, which has not yet been built. The New Haven project called for construction of 12 additional tracks in the Westchester yard, New York. The tracks were to have been used for storing materials awaiting shipment.

NEWS OF INDUSTRY

**Guide in Great Demand**

• • • Orders for the new IRON AGE Simplified CMP and Priorities Guide are pouring in from nearly every metalworking plant in the nation. The supply is going fast—so, if you want extra copies please order them this week.

Prices are: 25c. for quantities to 10 copies; 20c. in lots above 10 to 25 copies and 18c. for over 25 copies. For orders of less than \$1 please send stamps or coin. Address: THE IRON AGE, Reader's Service Dept., 100 East 42nd St., New York.

**Harmony Meetings**

**To Fix Bottlenecks**

• • • A series of "harmony meetings" at plants over the nation, designed to coordinate war production problems and help break bottlenecks in critical materials and components, was announced to the Truman Committee at Washington, Monday by Under-Secretary of War Patterson.

The projected tour of plants throughout the country, Mr. Patterson said, will be made by a party including himself, Mr. Jeffers, James V. Forrestal, Under-Secretary of the Navy, and an official yet to be named from the office of Secretary Ickes.

The harmony project took the investigating committee by surprise. It was evolved, Mr. Patterson explained, from conferences arranged "outside the government." Reports were that the get-togethers were suggested and urged by Ferdinand E. Eberstadt, former vice-chairman of WPB in charge of the flow of materials to war producers, who was ousted by Donald M. Nelson, WPB chairman, last February.

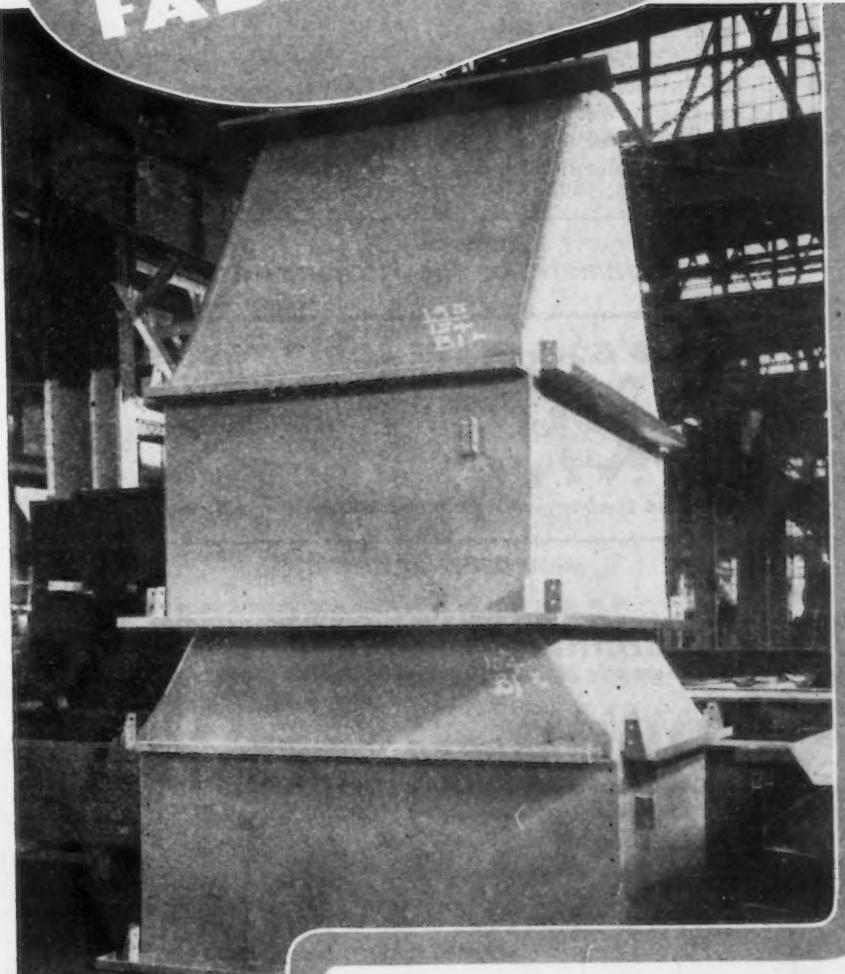
**Class B Allotments Exhausted**

• • • Producers of class B products under the Controlled Materials Plan which have not yet received allotments of their controlled materials for this quarter will not be given any, and will continue to operate as a PRP unit.

Letters sent by J. Joseph Whelan, recording secretary of WPB, stated that the allotment of controlled materials to be made in this quarter for class B products has become exhausted. Companies which have not operated as PRP units may apply or extend preference ratings during this quarter in accordance with existing priorities procedures, the letter said.

# LEVINSON

## Special STEEL FABRICATION



For years Levinson Steel has enjoyed an enviable reputation for excellent service and workmanship in the fabrication of structural steel. Another important phase of Levinson Steel service is the fabrication of steel for heat-treating furnaces and for other special war production equipment.

### The LEVINSON STEEL Company

Fabricators of Structural and Miscellaneous Steel

33 PRIDE STREET · PITTSBURGH, PA.

## Component Orders and Needs to Be Balanced Under New WPB Procedure

### Washington

• • • WPB is considering the establishing of a new industrial procedure soon. Forced by the issuance of order M-293 on components, the new plan will flow components and sub-components by establishing a relationship between orders for them and the program for which they are intended. Requirements will be established for these items through the use of a new form and capacity for their production will be adjusted with the requirements. Components will be flowed to the highly critical 100 octane gasoline, synthetic rubber, aluminum, mag-

nium, steel, ships and power generating plant programs and projects. The new scheme will be known as the component scheduling plan.

The new plan will only apply at first to the following Claimant Agencies: War Department, Navy Department, Maritime Commission, Air Forces, Office of the Rubber Director, Lend-Lease, Office of Petroleum Administrator, WPB Facilities Bureau, Office of War Utilities and Canadian Division.

**Control Components** are: Turbines and turbo-generators, motor generator sets, internal combustion engines,

boilers, compressors, boiler and dry vacuum pumps, turbo-blowers and exhausts, steam condensers, heat exchangers, pressure vessels, fans and blowers, switch gear, pumps, stokers, pulverizers, transformers.

To be "control components" the foregoing must be purchased directly from the manufacturer by the prime contractor who is building the project or the programmed product into which the components will go.

Sub-components under the plan are: Crankshafts, fuel injectors, carburetors, magnetos, reduction gears, electric motors, electric motor controls and generators.

To be a "sub-component" under the plan it makes no difference who purchases them, except if they are "control components" as listed in the foregoing paragraph and will only then be thus classified if purchased by a person other than the prime contractor.

The new form to be used under the component flowing scheme will require the following information:

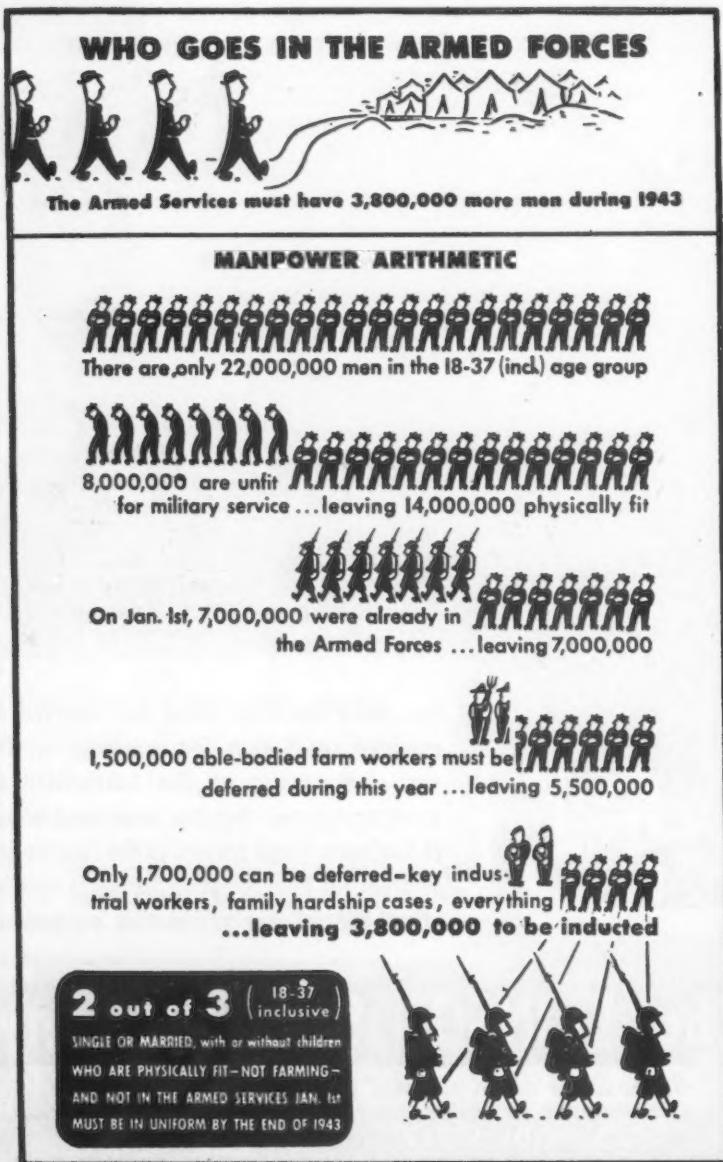
Name and address of the company; name of the Claimant Agency responsible for the program; the program or project into which the component will go; the government contract number; the name of the company placing the order; the application or use of the component; specifications; a 24 months projection of the required delivery schedule; the manufacturer's promised delivery schedule and the manufacturer's actual date of shipments.

The form is supposed to accomplish the following aims: (1) Identification of components by programs; (2) The scheduling of required deliveries; (3) The reporting of actual deliveries and (4) The reporting of delivery schedules to industry divisions.

The CSP Claimant Agencies responsible for the programs or projects requiring "control components" are responsible for presenting to the appropriate WPB Industry Divisions the CSP Form covering all orders for "control components" placed after the effective date of the plan.

When the WPB industry division receives the CSP Form, it compares the required delivery schedule with the component manufacturer's existing schedule of deliveries as frozen under Order M-293, and makes whatever adjustment is necessary. If the CSP delivery schedules does not conflict with the schedule as frozen under M-293, no adjustment will be made, but if conflicts appear, adjustment

### The Arithmetic of the Nation's Manpower



will be made in the manufacturers schedule. If adjustment cannot be made, then the orders will be placed with another manufacturer.

After WPB has approved the CSP Form it is returned to the Claimant Agency involved. The Claimant Agency then gives the CSP Form to the prime contractor who is to order the "controlled component" or "subcomponent."

The prime contractor passes the approved CSP Form on to the component manufacturer.

When the "control component" manufacturer receives the approved CSP Form, he shows the prime contractor what the effect of the required delivery schedule on the CSP Form will be on his own promised deliveries. Final adjustment of schedule comes at this point, it is predicted, with the "control component" manufacturer advising the "Claimant Agency and the prime contractor of his ability to produce. If the "control component" manufacturer needs subcomponents to fulfill required delivery schedules, he should receive subcomponents manufacturers promised delivery schedules before indicating his promised delivery schedule for the "control component."

When instructed by the prime contractor, the "control component" manufacturer returns a copy of the CSP Form on which he has indicated his promised delivery schedule, who in turn returns it to the Claimant Agency if he is so instructed. "Control component" manufacturers may submit copies of the CSP Form as proposed delivery schedules for the orders represented by these forms. This action is in accordance with procedure provided by M-293 with respect to "X" components.

In "subcomponent" purchasing, the placing of a CSP Form with the manufacturer is mandatory on all persons. If the subcomponent is ordered by a "control component manufacturer," the CSP Form which the "control component" manufacturer gives is the basis for the CSP Form which the "control component" manufacturer gives to the "subcomponent" manufacturer. As in the case of a "control component" a CSP Form may not contain more than one class of component to be ordered from one manufacturer, but several "subcomponents" of a class to be produced by a manufacturer for use in several programs for which one Claimant Agency is responsible, may be listed on a single CSP Form. Adjustment of schedules procedure is the same as in "control components."

## U. S. Steel Seen Vindicated on Plate Charges, Senator Davis Claims

### Washington

• • • Discussing charges made by the Truman Senate Committee regarding plate production at the Irvin Works of the Carnegie-Illinois Steel Corp., Senator James J. Davis, Democrat of Pennsylvania on Wednesday of last week told the Senate that when the public becomes acquainted with all the facts he is certain the Irvin Works and its employees will be fully vindicated and their names properly cleared. The Senator, a former pub-

*See Irving S. Olds statement regarding C-I plate charges, page 124.*

dler, said he based his remarks on a visit he made on April 24 to the plant where he interviewed representatives of the CIO United Steel Workers and representatives of the plant management. In addition, he said, he made a thorough review of all the processes and relative factors involved in the production of plates at the Irvin Works.

To the unprecedented demand for plates and relentless pressure on both worker and manager, the Senator attributed the failure to carry out required tests, but he pointed out that was done with the knowledge that the quality of the plates concerned came within the specified range of suit-

ability for ship construction. He declared that the employees were motivated by no ulterior purpose but only with increased production to aid in the war effort.

"I feel," said Senator Davis, "that if all the Senators on that (Truman) Committee had had the opportunity, which I have had, of personally inspecting this matter the entire question might have been cleared up to the satisfaction of all parties concerned without recourse to legal proceedings."

The Pennsylvania Senator said that a careful reading of the Truman Committee's report will show no evidence that any officer, inspector, or anyone else concerned, profited by failure properly to record test figures which were lost in the haste to increase production. There was nothing in the Truman report, it was pointed out, to prove that the plates actually were substandard.

"As an old steelworker," Senator Davis said he could well understand these circumstances regarding list records and "guessing at the figures." He declared that he did not believe "that any useful purpose will be served by trying to place the brand of traitor on those men who labor and are now laboring, to produce the steel necessary for America's war effort, for this omission on their part came only from the desire to increase the production of that very vital commodity."

"The records which the steel industry has attained throughout the years do not warrant the implications of a criminal case, nor do they warrant the charge of an attempt to supply substandard steel for ship construction purposes."



### Cited for Award

• • • The Army-Navy "E" has been awarded the following companies for excellence in production:

Sarco Co., Inc., New York.  
American Gear & Mfg. Co., Chicago.  
B. F. Goodrich Co., Akron, Ohio.  
Ladish Drop Forge Co., Cudahy, Wis.  
Cincinnati Planer Co., Cincinnati.  
Philco Corp., Storage Battery Division,  
Trenton, N. J. (star).  
Westinghouse Electric & Mfg. Co., East  
Pittsburgh Works, East Pittsburgh, Pa.  
(star).  
Simmons Machine Tool Corp., Albany,  
N. Y. (star).  
American Brass Co., New York (star).  
Norton Co., Worcester (second star).

### ODT Suspends Lake Coal Movement

#### Cleveland

• • • To permit greater utilization of Great Lakes vessels still unable to break through the Soo locks into Lake Superior, the Office of Defense Transportation on April 30 suspended for another two weeks restrictions on the movement of coal over certain lake routes. While some boats have been able to get into Duluth and out again, the passage between Lake Huron and Lake Superior is not sufficiently free of ice to allow full-scale ore operation.

## WPB Limits Oil Country Goods To 168 Items Based on API Simplifications

### Washington

• • • To help meet the increased demands for oil country tubular goods used in the production of petroleum products and gas, WPB last Friday issued a simplification schedule which cuts in half the number of permitted

sizes and specifications. Schedule 9 to Order L-211 (National Emergency Specifications for Steel Products) limits the production of oil country tubular goods to a list of 168 items, based largely on a simplified list developed some time ago by the American Petroleum Institute. Formerly,



## We'll pass it on to them if you'll pass it on to us

So say the Marines . . . and our fighting men everywhere. They'll pass on the ammunition, if we'll pass it to them.

Maintain capacity war production at top-speed efficiency. Use the best quality packings, gaskets and oil seals . . . they give the longest service and help you avoid frequent shut-downs.

THE GARLOCK PACKING CO., PALMYRA, NEW YORK  
In Canada: The Garlock Packing Co. of Canada, Ltd., Montreal, Que.



**GARLOCK**

### CMP Forms and Uses

- CMP-1—Summary bill of materials.
- CMP-2—Detailed bill of materials.
- CMP-3—Statement of requirements for Class B, Group I products and GFE for bill of materials.
- CMP-4A—Application for allotment of controlled materials for Class A products.
- CMP-4B—Application for allotment of controlled materials for Class B products.
- CMP-4C—Application for allotment of controlled materials for construction and facilities projects.
- CMP-5—Short form for extending allotments to secondary consumers.
- CMP-6—Revoked.
- CMP-7—Quarterly report form covering shipments of products and inventories of critical materials.
- CMP-8—Report by producers of carbon and alloy steel and wrought iron of shipments and unfilled orders.
- CMP-9—Supplementary application for allotments for aluminum forgings, pressings or impact extrusions.
- CMP-10—War Department allotment form.
- CMP-11—Steel warehouse stock replacement form.
- CMP-12—Weekly report of authorized orders of aluminum producers.
- CMP-13—Application for aluminum for special alloying and chemical uses.
- CMP-14—Application for allotment for construction and facilities when OCS is the Claimant Agency.
- CMP-15—Statement of requirements for critical components to accompany CMP-14.
- CMP-16—Application for allotment for construction and facilities when the Facilities Bureau is the Claimant Agency.
- CMP-17—Statement of requirements for critical components to accompany CMP-16.
- CMP-19—Monthly report of aluminum castings operations, inventory and orders.
- CMP-21—Aluminum distributors' weekly report of orders accepted for delivery.
- CMP-22—Steel castings producers report of shipments, past due orders and unfilled orders accepted for shipment and monthly capacity.
- CMP-23—Aluminum ingot primary producers' and secondary smelters' monthly report of shipments and unfilled orders.

more than 300 items were produced by the industry.

The schedule is expected to result in a tubular goods production increase of about 15 per cent and ease the burden placed on mills by requirements for pipelines, munitions and other essential equipment.

The term "oil country tubular goods" means oil well casing, tubing and drill pipe. The schedule makes exceptions for oil well casing produced by electric fusion welding; for orders entered prior to April 30, provided delivery is made before June 30; and in certain cases, for items with special thread dimensions or types of joints.

At the same time, WPB issued Schedule 10 to L-211, which provides for the establishment of standard specifications for water well tubular products. These cover water well casing, drive pipe, reamed and drifted pipe, drive well pipe, pump pipe and couplings.

AMERICAN

# Aircraft Motors

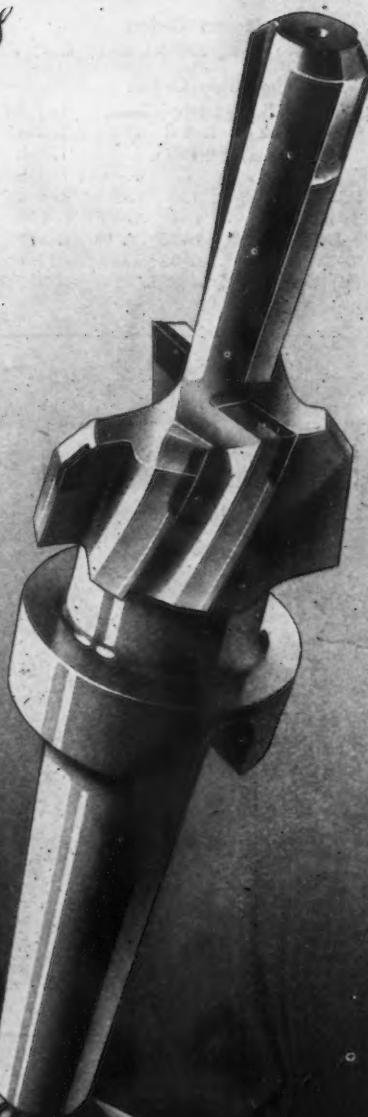
SET THE PACE . . .

Aircraft manufacture—America's No. 1 industry today! Making the best, the fastest, the hardest hitting planes ever built—and more of them! Beating quotas and schedules—setting a new pace for fast and precision production. » » » And right in step—Wesson Carbide Cutting Tools establish new standards for cutting tougher metals, faster—with precision and perfection never before attained.

Wesson leadership, recognized in aircraft motor production, will meet the challenge of new and finer "tooling up" for post-war production.

The counsel of Wesson engineers—skilled in engineering and designing of cutting tools—is available to help solve present war production problems, or for post-war planning.

WESSON CO., DETROIT, MICH. (Ferndale Station)



They will all serve better, last longer, cost less and be safer. One important reason is that Wesson Carbide Cutting Tools will enable the manufacturers of all these products to use more durable, tougher metals—insure greater precision and perfection—and at the same time cut costs by saving production time.

**WHEN IT'S OVER "Over There"** we'll all have a higher standard of living "over here." Better vacuum cleaners, refrigerators and washing machines—better cars, trucks, planes, bicycles—better tractors, plows and other farm machinery. Industrial plants will have better tools and better machines.

## Record of Expired or Obsolete Orders

### Equipment Orders

E-1; E-1-a; E-2; E-2-a; E-3; E-8\*

### Limitation Orders

L-1; L-1-a; L-1-b\*; L-1-c; L-1-d; L-1-f; L-2; L-2-a; L-2-b; L-2-c; L-2-d; L-2-e; L-2-f; L-2-h; L-3; L-3-a; L-3-b; L-3-c\*; L-3-d; L-3-e; L-4; L-4-a; L-4-b; L-4-c; L-5-a; L-5-b; L-6; L-6-a; L-6-b; L-7; L-7-a; L-7-b; L-8; L-9\*; L-10\*; L-12\*; L-13; L-14\*; L-15; L-16; L-17\*; L-18; L-18-a; L-19\*; L-22; L-23; L-23-a; L-23-d; L-24\*; L-25; L-26; L-26-a;

L-26-b; L-26-c; L-26-d; L-30; L-34\*; L-35; L-42 (Schedules I, II, VII, IX); L-42\* Schedule XI; L-45\*; L-47\*; L-50; L-54; L-54-a-1; L-54-b; L-59-a; L-66\*; L-72-a; L-82; L-82-a; L-87\*; L-96\*; L-109\*; L-113; L-119\*; L-121; L-122\*; L-124\*; L-125\*; L-127\*; L-129\*; L-132\*; L-133\*; L-138\*; L-141\*; L-146; L-149\*; L-154; L-155\*; L-156\*; L-160\*; L-162\*; L-164\*; L-166\*; L-167\*; L-171.

### Conservation Orders

M-1; M-1-a; M-1-b; M-1-c; M-1-e;

# ARMSTRONG



### ARMSTRONG TOOL HOLDERS will carry you thru the War and also the Reconstruction

Great as has been the demand for ARMSTRONG TOOL HOLDERS for tooling new lathes, planers, slotters and shapers; and for re-tooling thousands of existing machine tools for new war work, no vital war work has been held up for want of them.

In the universal use of these efficient multi-purpose tools, lies one of America's great industrial advantages—America's ability to (1st) change-over immediately to the manufacture of war tools, jigs and fixtures, (2nd) the ability to safely step-up speeds and feeds to the full capacity of the machine tool—for ARMSTRONG TOOL HOLDERS will stand up to any cut a machine can attain, (3rd) the ability to make each ounce of critical high speed steel do 10 times the work it can do in countries dependent on hand forged tools—ARMSTRONG TOOL HOLDERS Save 90% High Speed Steel.

When the war is won these same ARMSTRONG TOOL HOLDERS will give America the same advantages in changing back to peacetime industry . . . for ARMSTRONG TOOL HOLDERS are permanent tools that give many years of service.



### ARMSTRONG BROS. TOOL CO. "The Tool Holder People"

309 N. Francisco Ave.

Chicago, U.S.A.

Eastern  
Warehouse & Sales:  
199 Lafayette St.,  
New York



### Form CMP-23 Issued for Aluminum Reports

• • • A new form—CMP-23—will be used by primary producers and secondary smelters of aluminum to report monthly shipments of, and unfilled orders for, aluminum ingots, WPB announced last week.

Two copies of this report are to be filed for each month by the 10th day of the following month. The first report, covering shipments made during April, and unfilled orders at the end of April, is to be filed with the Aluminum and Magnesium Division by May 10.

The new form will replace the following reports now filed by primary producers and secondary smelters: (a) monthly confirmatory Form PD-26A; (b) Section E of Form PD-272.

M-1-f; M-2; M-2-a; M-3; M-3-a; M-4; M-4-a; M-4-b; M-4-c; M-4-d; M-4-e; M-4-f; M-4-g; M-4-h; M-4-i; M-4-j; M-4-k; M-4-l; M-4-m; M-4-n; M-5; M-5-a; M-5-b; M-6; M-7; M-8; M-9; M-11-b; M-11-c; M-11-d; M-11-e; M-11-f; M-11-g; M-11-h; M-11-i; M-11-j; M-11-k; M-14; M-15; M-15-a; M-16; M-18; M-20; M-21-b; M-21-f; M-23; M-24-a; M-29-a; M-32; M-33; M-35; M-37; M-37-a; M-37-b; M-37-c; M-38-a; M-38-b; M-38-d; M-38-e; M-38-f; M-38-g; M-38-h; M-38-i; M-38-j; M-39-a; M-39-b; M-42\*; M-43-a; M-44; M-48\*; M-52; M-55; M-55-a; M-55-b; M-55-c; M-55-d; M-55-e; M-55-f; M-55-g\*; M-55-h; M-63-b; M-63-d; M-64\*; M-67; M-68-a\*; M-68-b\*; M-68-c; M-73-a; M-74\*; M-80-a; M-80-b; M-80-c; M-80-d; M-80-e; M-80-f; M-80-g; M-81-a; M-81-b; M-83; M-86; M-86-a; M-86-b; M-86-c; M-86-d; M-86-e; M-88\*; M-90\*; M-92; M-98; M-98-a; M-108; M-111; M-111-a; M-111-b; M-111-c; M-111-d; M-111-e; M-116; M-119; M-120\*; M-121\*; M-127; M-127-a; M-127-b; M-129; M-135; M-135-a; M-135-b; M-135-c; M-136; M-140\*; M-141-a; M-141-b; M-141-c; M-144; M-145-a; M-147; M-151\*; M-154-a; M-154-b; M-158; M-172; M-173\*; M-180\*; M-192; M-195\*; M-197; M-202\*; M-205; M-205-a; M-213\*; M-219; M-223\*; M-231; M-232\*; M-237; M-245; M-259; M-267; M-273-a.

### Preference Rating Orders

P-1; P-2; P-2-a; P-2-b; P-2-c; P-2-d; P-2-e; P-2-f; P-2-g; P-2-h; P-2-i; P-2-j; P-2-k; P-2-l; P-2-m; P-2-n; P-2-o; P-2-p; P-2-q; P-2-r; P-2-s; P-3; P-4; P-5; P-5-a; P-5-b; P-6; P-6-a; P-7; P-8; P-9\*; P-9-a; P-9-b; P-9-c; P-9-d; P-9-e; P-9-f; P-9-g; P-10; P-11; P-11-a; P-12; P-13; P-14\*; P-15; P-16; P-17; P-18; P-18-a; P-19; P-19-a; P-19-b; P-19-c; P-19-d; P-19-f\*; P-19-g; P-20; P-21; P-22; P-23; P-24; P-25\*; P-25-a; P-25-b; P-25-c; P-25-d; P-25-e; P-26\*; P-26-a; P-26-b; P-26-c; P-26-d; P-26-e; P-27\*; P-28\*; P-29; P-30\*; P-31; P-32; P-33; P-34\*; P-35; P-36\*; P-37\*; P-38; P-39; P-40; P-41; P-41-a; P-41-b; P-41-c; P-42; P-42-a; P-44\*; P-45; P-45-a; P-46; P-46-a; P-46-b; P-46-c

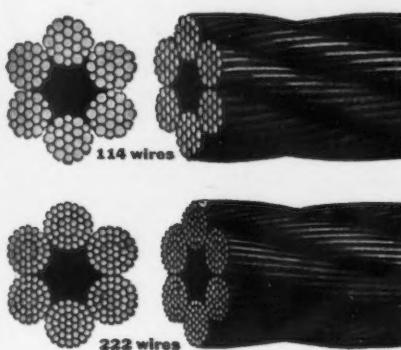
# A Short Breaking-in Period Extends Wire Rope Life

*[This is Number 14 of a series of informative articles on how to get the most out of wire rope. It is directed to those who want to do everything they can to lengthen wire rope life and conserve steel. Other articles in the series are available on request.]*

\* \* \*

Cooperation in the present emergency is a vital necessity to success. It is a basic fundamental without which wars cannot be won, freedom cannot be maintained.

Cooperation within a piece of wire rope is just as essential to its success, but, being wire rope, it needs our help to do its job.



There are 114 or more wires in the average wire rope. They need to cooperate together by each carrying their share of the load. Illustrated above are two standard ropes showing number of wires in each.

The process of manufacture lays these wires into a rope and manufacturers ship this rope to you prepared to do its task.

The rope's success depends a great deal on how it becomes adapted to the equipment and to the work it must do.

## WHAT "BREAKING IN" MEANS

For example, we all know that the life of a book depends upon proper handling at the start. To simply grab a book and pop it open injures the binding, but by gradually and carefully opening the book at different points, it becomes "broken in" and its life is greatly extended.

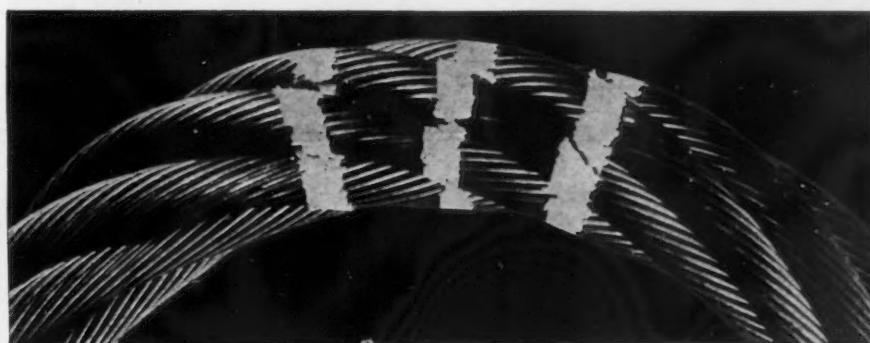
Wire rope is a complex machine that has many wires, like a book has many pages. When the rope is put into use, a little care in handling and operating it at first, pays dividends later. Haste

makes waste, which you want to avoid.

The breaking-in period gives the rope a chance to adapt itself to the track or path in which it must travel. It becomes accustomed to the arc of bending, becomes comfortably seated in the groove and assures the operator, after a short "trial run," that it is ready to go to work safely.

## "BUT WE CAN'T TAKE THE TIME TODAY!"

The actual time taken to properly break in a rope is a small percentage of the time it takes to install a rope. If you must replace rope often and you can cut down the number of replacements by extending rope life, you will be conserving steel, reducing costs, and actually saving time.



## BENDING DOES THIS

To get the picture (above) three white stripes were painted around a  $\frac{5}{8}$ " 6x37 PREformed wire rope before bending. Then the wire rope was flexed by hand and this picture taken. Notice how the paint cracked up and separated, caused by the movement of the wires and strands to make the bend. Getting the rope accustomed to this flexing and wire and strand movement is a job of breaking in.

## "WHAT SHALL WE DO?"

First, as has been explained in previous articles of this series, the equipment should be in good repair.

Second, as explained in article 9 of this series, the rope should be unwound from the reel or coil so as to avoid twisting and kinking.

Third, the rope should be firmly attached to the equipment, taking care to seize it with wire to prevent it untwisting.

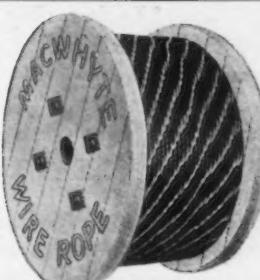
Fourth, after rope is attached and reeved around sheaves and drums, operate it without load a few times, until you see that it is flexing easily over sheaves and winding correctly on the drum.

Fifth, gradually increase the speed and load until the rope is operating up to its normal loading and speed.

## WHAT ABOUT PRE-FORMED ROPE?

During the manufacture of the rope, the process of PREforming adjusts the wires and strands into the helical shape they take in the rope. This is often called a "breaking-in" process that helps prepare the rope for quick use and therefore it should not require as much "breaking in" on the job.

However, whether PREformed or non-preformed, it pays to handle the rope carefully and give it a chance to get accustomed to the operation of the equipment.



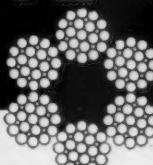
## MONARCH Whyte Strand PRE-FORMED WIRE ROPE

... Macwhyte premier wire rope, famous for its strength, toughness, and internal lubrication.

NO. 666

# MACWHYTE COMPANY

WIRE



ROPE

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KENOSHA, WISCONSIN



Manufacturers of MACWHYTE PREformed and Internally Lubricated Wire Rope  
MACWHYTE Special Traction Elevator Cable    MACWHYTE Braided Wire Rope Slings    MACWHYTE Aircraft Cables and Tie-Rods

## PRICES

P-48\*; P-49\*; P-50\*; P-51; P-52; P-53; P-54; P-56-a; P-57; P-59\*; P-60\*; P-61; P-62; P-63\*; P-64\*; P-66\*; P-67\*; P-69\*; P-70\*; P-71; P-72; P-74; P-75; P-76; P-77; P-78; P-79; P-80\*; P-81\*; P-82; P-83; P-85; P-86; P-87; P-90; P-91; P-92; P-93\*; P-94; P-95; P-96\*; P-97\*; P-98; P-98-a; P-98-d; P-99\*; P-100; P-102\*; P-103; P-103-a; P-104\*; P-105\*; P-106; P-107; P-108; P-109; P-109-a; P-110; P-111\*; P-112\*; P-113\*; P-114\*; P-117\*; P-119\*; P-120; P-121\*; P-124\*; P-125\*; P-127\*; P-128\*; P-129; P-134; P-138.

\*Not issued.

## Warehousemen to Meet on Steel Zone Price Ceilings for Remaining 34 States

### Washington

• • • Meetings to be held in Washington in May by OPA with heavy line iron and steel warehousemen from the Pacific Coast and the South will complete industry surveys preliminary to establishing dollars and cents maxi-

mum prices by zones for their products throughout the entire country. Probably before the last of the meetings is held specific ceilings will be announced for six zones in addition to the four that went into effect on April 15. These will be Nos. 5 to 10, including marketing areas in 27 states in part of the East, Middle-West and the West. All or part of the 14 states were included in the four Eastern zones first established. Specific zone prices supersede the "freeze-date and formula" method of controlled pricing which is still in effect in the unzoned areas.

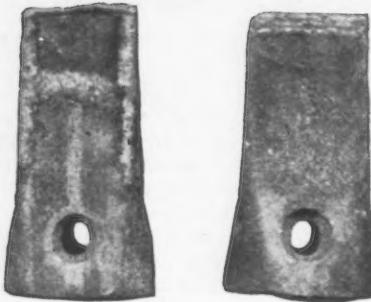
Data and proposals from the industry are being compiled, or have been compiled by committees in each zoning area under the general direction of the Steel Warehouse and Jobbers' Advisory Committee and the OPA.

These are then discussed with OPA at meetings in Federal Office Building No. 1, Second and D Streets, S. W. Meetings for the South will be held on May 6 and 7, and will be attended by heavy line warehousemen representing the western part of North Carolina, South Carolina, Tennessee, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas and New Mexico.

The meetings with industry members from the Pacific Coast will involve the marketing territory comprising Arizona, Nevada, Utah, Idaho, California, Oregon and Washington. Territory centering in Los Angeles will be represented at a meeting on May 20, that centering at San Francisco on May 21, that related to Portland, Ore., on May 24, and that involving Seattle, Wash., on May 25.

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A trial will convince you that Coast Metals Hard-Facing can't be equalled for keeping equipment constantly on the job without unnecessary time out for repairs or replacements. Application is simple—either by the electric welding arc or the oxy-acetylene torch—to new or worn equipment parts of any ferrous metal, including manganese steel, alloy steel, cast iron and chilled iron.

Tell us your wear-resistance problem. Coast Metals Hard-Facing can help you make your equipment last longer.

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**COAST METALS**  
**hard-facing**  
**weld rods**

YOUR EQUIPMENT'S LIFE PRESERVER AGAINST WEAR

### OPA Issues New Rulings On 3% Transportation Tax.

• • • The OPA has recently issued the following interpretations to Price Schedules concerning the 3 per cent federal transportation tax as it affects ceiling prices. Digests of the interpretations follow:

#### Price Schedule 1

##### Second-Hand Machine Tools

Violations—sale of machine at higher than maximum price where total price of all machines sold in same transaction does not exceed aggregate maximum price. The sale of a second-hand machine tool at a price in excess of the maximum price is a violation of the Schedule, even though the total price for that machine and other machines sold in the same transaction does not exceed the aggregate maximum price for all of the machines.

#### Price Schedule 2

##### Aluminum Scrap and Secondary Aluminum Ingots

Price Determination—secondary aluminum ingot—delivery charges. Under Supplementary Order No. 31—Tax on Transportation of

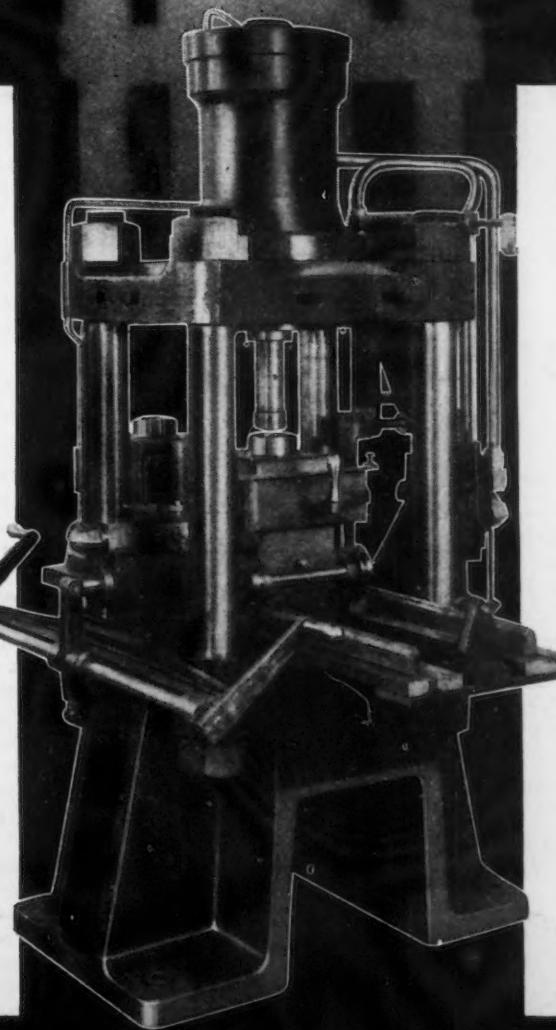
# ANNOUNCING MODEL "K" SERIES

# Presses

# Hydraulic



A new type of "Hy-Mac" hydraulic press that may be adapted to capacities up to 150 tons, (identified as a "K" Series) is operated by a separate motor driven power units. It is a press that is ordinarily manually controlled from a four-way valve—automatically cutting-off when the predetermined pressure or tonnage has been reached—ipm. of closing speed, power speed and opening speed as per specifications. The frame of the press is made up of heavy castings bolted together by steel tie rods with the power cylinder assembled vertically on the top and above a base platen 19" (right to left) x 13 $\frac{1}{4}$ " (front to rear) on the 75- and 100-ton presses. The



K75 (Illustrated)—  
at 2000 lbs. per sq.  
in. cylinder—10" bore  
stroke—here our fa-  
vorite for making fixtures  
used—the set-up pro-  
for two operators—  
arrangement.



platen is 1" larger in each dimension on the lighter models and 1" or  $\frac{1}{2}$ " smaller on the larger ones because of 3" instead of 4" tie rods on the former, and 4 $\frac{1}{2}$ " or 5" tie rods on the heavier types. Maximum daylight—the length of stroke, diameter of cylinder are built to specification, the bore and stroke varying in ratio to the capacity required. The platen is 27" from the floor—height 75-ton press—overall is 82" (varying a few inches one way or other depending upon length of stroke)—without power unit, the press occupies a floor space of 25" x 50"—power unit may be adjacent to press or a remote installation.

**HYDRAULIC  
MACHINERY, INC.**  
12825 FORD ROAD  
DEARBORN, MICHIGAN

# HYDRAULIC MACHINERY

## PRICES

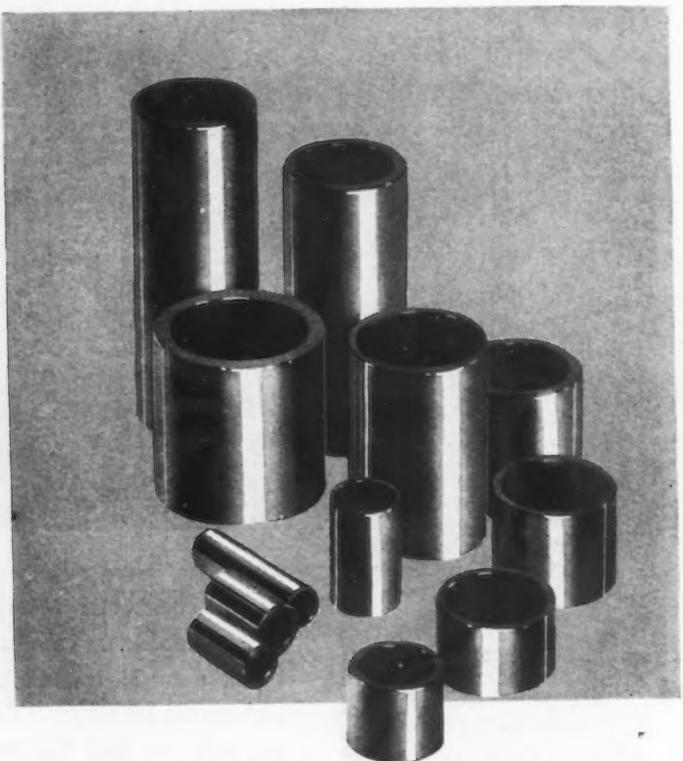
Property Imposed by Revenue Act of 1942, the 3 per cent tax on freight bills is treated by OPA as an increase in freight. Therefore, the "lowest carload rate of rail freight" is the carload rate plus the 3 per cent tax on the amount of the carload rate. The resulting amount must be allowed by the seller to the extent of 75c. per hundredweight. In the case of less than carload shipments the amount of the freight allowance is calculated in the same way.

### Price Schedule 12

#### Brass Mill Scrap

Price Determination—yellow brass contain-

ing 2 to 3 per cent lead. No specific price is established for yellow brass containing 2 to 3 per cent lead, and hence the maximum price is determined pursuant to the normal differential clause of the Schedule. Section 1309.19 (b) (1). During the period July 22, 1941, to Feb. 11, 1942, leaded brass generally sold at the same price as Heavy Yellow Brass and hence the maximum price of leaded brass, as determined under the normal differential clause of the Schedule, is the same as the maximum price for "yellow brass-heavy scrap", i.e., 85c. per lb. f.o.b. point of shipment.



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• Why not check your bearing sizes today? Write for a copy of our new catalogue. It lists more than 850 stock sizes for immediate installation. Oil grooves, slots and holes can be quickly, economically added. You will save both time and money — with STANDARDIZATION.

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**BRONZE**  
HEADQUARTERS  
NEW CASTLE, PA.

### Price Schedule 43

#### Used Steel Drums and Used Steel Pails

Price Determination—drum without head. A used steel drum without a head is not a "reconditioned drum," since it is not "fit for reuse as a container," Section 1306.209 (a) (5); the maximum price is that for a "raw used drum."

### Price Schedule 46

#### Relaying Rail

Price Determination—Federal transportation tax. Under Supplementary Order No. 31—Tax on Transportation of Property Imposed by Revenue Act of 1942, the 3 per cent tax on freight bills is treated by OPA as an increase in freight. Therefore, the tax should be combined with the "lowest railroad charge," in calculating the maximum price of relaying rail under Section 1306.260 (b).

### Maximum Price Regulation 214

#### High Alloy Castings

Price Determination—Federal transportation tax. The following interpretation was given concerning the 3 per cent Federal transportation tax effective Dec. 1, 1942, and Supplementary Order No. 31:

Since, in general, maximum prices under Maximum Price Regulation No. 214 are on a freight allowed to destination basis, sellers of high alloy castings may not add the 3 per cent tax on transportation to the maximum prices for high alloy castings. They must, in effect, absorb it. The following two circumstances are the only exceptions:

(1) In ascertaining a maximum price pursuant to Section 1421.15 (b) where the shipment totals less than 100 lb., the seller may add the 3 per cent tax to the applicable transportation charges;

(2) In ascertaining a maximum price pursuant to section 1421.15 (b) where the buyer specifies means of transportation costing in excess of the lowest applicable railroad rates, the 3 per cent tax on the excess may be added.

In ascertaining a maximum price pursuant to Section 1421.15 (a), where on similar sales during the base period the producer added a charge for transportation, the 3 per cent tax on such charge may be added.

### Maximum Price Regulation 235

#### Manganese Steel Castings and Products

Price Determination—Federal transportation tax. The following interpretations were given concerning the 3 per cent federal transportation tax effective Dec. 1, 1942, and Supplementary Order No. 31:

(1) Where maximum prices under Maximum Price Regulation No. 235 are established on an f.o.b. basis plus freight from shipping point to destination the seller may add the 3 per cent tax to the applicable transportation charges in ascertaining his maximum prices.

(2) Where the buyer specified a means of transportation costing in excess of the lowest applicable transportation charges, the seller may add the 3 per cent tax on the excess in ascertaining his maximum prices.

(3) Where the maximum prices are established on a freight equalization basis, the seller may add only 3 per cent of the applicable transportation charge from the equalization point to destination, and the 3 per cent on whatever freight is equalized must be allowed by the seller in ascertaining his maximum prices.

## PRICES

### Maximum Price Regulation 244

#### Gray Iron Castings

Price Determination—flat prices. The following summarizes various interpretations on the subject of sales of gray iron castings on a flat price basis:

(1) If the seller sold or offered for sale gray iron castings to a particular customer at a flat price at any time between Aug. 1, 1941, and Feb. 1, 1942, the flat price becomes the seller's maximum price on sales to that customer of castings which are substantially the same as those falling within the flat price classification.

(2) In the situation outlined in (1) above, the flat price is, in almost all cases, not the maximum price to customers other than the customer with whom the flat price agreement or offer was made since they must be regarded, in almost all cases, as purchasers of another class.

(3) In the situation outlined in (1) above, if the customer's requirements materially change and the castings ordered are different in kind or are ordered in materially different proportions from that originally contemplated in the flat price agreement or offer, the flat price no longer is the maximum price since the castings to be priced are not substantially the same as those sold or offered for sale during the base period. It will be necessary for the seller to compute the maximum prices of all the castings involved under the pricing formula method set forth in paragraph (b) of Section 1421.166, unless he chooses, and is entitled, to use the alternate pricing method established in paragraph (e) of that section, since the seller is not permitted to use the flat price as his maximum price for the less expensive castings and the formula method for the more expensive castings.

(4) Sellers may sell at a flat price under the formula method set forth in paragraph (b) of Section 1421.166. However, the flat price must be subject to adjustment on the basis of the average maximum prices of the castings delivered during a given period. In computing the average maximum prices of the castings delivered during a given period the seller may either

(1) Compute by the pricing formula method the maximum price of each casting delivered and then arrive at a weighted average of the maximum prices of all the castings delivered, or

(2) Keep a record of the total direct labor hours and any other necessary cost data applicable to the entire group of castings delivered and compute one average maximum price for all the castings by the pricing formula method. By "weighted average" is meant an average weighted by the quantities of each casting in the group which is delivered during the given period. In the situation under discussion, therefore, the flat price will be, in effect, only a convenience for billing and adjustment to the average maximum price will have to be made as hereinbefore specified. The seller's contracts and invoices should be stated to be subject to such adjustment, and adjustment should be made not later than 30 days following the end of each month in which the castings to be priced are delivered.

(5) If the seller sold or offered for sale gray iron castings on a cost plus or time and material basis during the base period set forth in paragraph (a) of Section 1421.166, the price finally determined is not a maximum price since no definite price was agreed upon at the time the contract or offer was made and the price cannot be made definite at the time the contract or offer was made by reference to the factors in the cost plus or time and material formula. This interpretation applies

whether or not the contract or offer was for an individually priced casting or a group of castings to be sold at a flat price.

### Price Determination—Oral Offer of Sale During Base Period

Where a company had flat prices of  $6\frac{1}{4}$  and 7c. per pound for certain castings and during the base period made an oral offer of sale at \$6.55 per hundred, a base period maximum price was not established, since only written offers of sale establish maximum prices under Section 1421.166. Even a written offer of sale at \$6.55 per hundred would not have established a maximum price, if the  $6\frac{1}{4}$  and 7c. per lb. prices were established by

a contract made during the base period, since contracts of sale take precedence over written offers of sale, Section 1421.164 (a) (10).

### Maximum Price Regulation 258

#### Chrome Ores

Violations—charge for weighing car before loading. The charge for weighing the car before loading may be added to the maximum price where the buyer requests it, since he is buying the ore f.o.b. railroad cars and the weighing is for his protection. It is a violation of the Regulation to add the charge for such weighing to the maximum price, unless the weighing is requested by the buyer.

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**CMP Briefs**

• • • Interpretation No. 5 of CMP Regulation No. 1 provides that orders for controlled materials placed before the purchaser has received his allotments may be converted into controlled materials orders when allotments are received, by furnishing the supplier with duplicate copies of the

purchase orders, certified as provided in CMP regulations. (WPB-3331)

• • • Direction No. 2, CMP Regulation No. 3 requires that manufacturers of combat measuring instruments will be required to schedule production of such items on the basis of preference rating alone, without reference to allotment numbers. (WPB-3325)

• • • Direction No. 6, CMP Regula-

tion No. 1 authorizes deliveries of steel from one producer to another, when the purchasing producer resells it at the mill price together with steel of his own production. (WPB-3340)

• • • CMP-23, a new form, will now be used by primary producers and secondary smelters of aluminum to report monthly shipments of, and unfilled orders for, aluminum ingots. (WPB-3355)

• • • Inventory Direction No. 7 to CMP Regulation No. 2 exempts from the inventory limitation such controlled materials as an operator may carry on his books to offset emergency repairs.

• • • It is expected that Claimant Agencies will require bills of materials giving information on B products, to be drawn up by B producers, especially those making products of a repetitive nature—things made over and over again.

• • • There definitely will be a new B list, observers say.

• • • There has been no clear-cut ruling of what mills should do when they receive several orders accompanied by allotment numbers at the same time, sum total of which puts them over their capacity. Best opinion is that the mills should fill the orders with the highest preference rating and reject the others.

• • • When contracts are amplified and more material is immediately necessary, a replacement application has generally been filed. A new interim application is coming through now to replace these replacement applications. These interim applications will be more and more difficult to get because Washington has given away all the available material in this quarter, and will do so in future quarters.

• • • Efforts are being made to get allotments set out three quarters ahead on a 100 per cent basis.

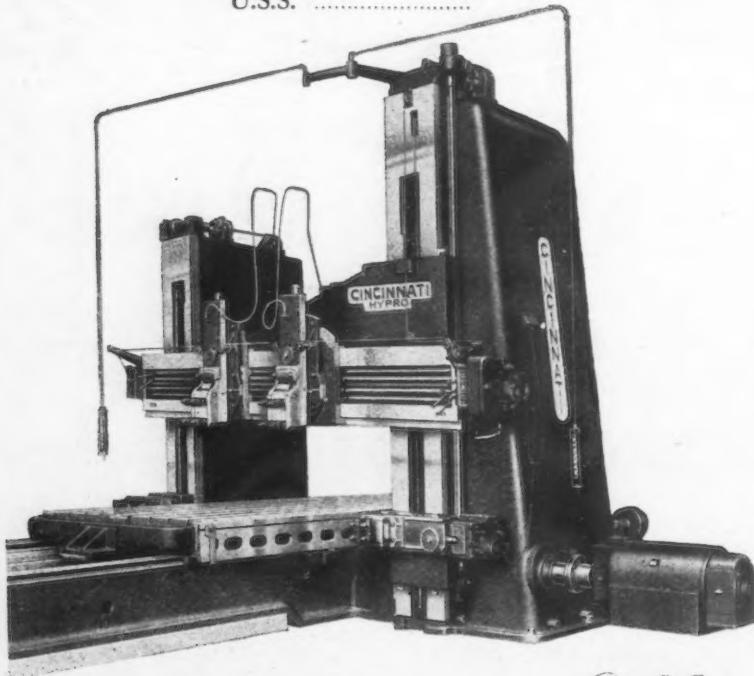
• • • There were so many late allotments and such slow transmittal of allotment numbers down to sub-contractors from prime contractors, that it is expected that the only way many producers will be able to fill their current quarter schedules is by the obtaining of directives to the mills. It is expected that many directives will be thus given out.

**PROUD OF HIS DAD**

"You can imagine how proud I was to have a dad who is foreman at the Cincinnati Planer Co. when the Navy sent me down to N. Y. Shipbuilding Co.

"We saw six Cincinnati Hypro Planers and Planer Type Millers working on various ship parts. I asked them how they like Cincinnati Hypros. They said these machine tools couldn't be beat. You should have seen all the different work they do.

Second Class Fireman  
U.S.S. ...."



132" x 96" x 40' Cincinnati Hypro Open Side Planer with Convertible Column

**PLANERS • PLANER MILLERS • BORING MILLS**  
**THE CINCINNATI PLANER CO.**  
**CINCINNATI, OHIO**

CMP PRIORITIES

**Who's Afraid of  
Big, Bad CMP?**

• • • Certainly not the man armed with the new IRON AGE Simplified CMP and Priorities Guide that makes operating under either plan truly understandable. It appeared in last week's issue as Section 2. It explains CMP procedure under all applicable regulations, provides for the first time a CMP Simplifier and lists current E, L, M, and P orders and an index to PD forms.

A supply has been printed so your whole staff can be equipped with this handy reference, but the supply is going fast. Prices are: 25c. each for quantities to 10; 20c. up to 25 copies and 18c. above 25 copies. For orders of less than \$1 please send stamps or coin. Address: THE IRON AGE, Reader's Service Dept., 100 East 42nd St., New York.

**Renegotiation Savings  
\$2½ Billion for 3 Agencies**

• • • Price reductions on war production contracts, refunds by contractors and miscellaneous recoveries effected through renegotiation of contracts by the War and Navy Departments and the Maritime Commission between April 28, 1942, and March 31, 1943, amounted to \$2,539,000,000 the OWI announced. Of this total, \$955,100,000 represents actual refunds by contractors and \$1,583,900,000 represents reductions in contract prices.

A few typical products and comparative approximate prices—based on contracts signed during the first quarter of 1943 as compared to the same period of 1942—follow:

Product	Current Unit Price	Unit Prices Approx. a Year Ago
Bombers (airframes only)	\$160,000	\$235,000
Fighters (airframes only)	72,000	84,000
Attack bombers (airframes)	64,000	76,000
Automatic pilots	2,200	2,900
Generators	490	590
X-ray field units	1,060	1,270
75 mm. tank guns	2,150	3,000
20 mm. anti-aircraft cannon	840	1,280
30 cal. A.C. machine guns	230	290
50 cal. A.A. machine guns	450	640
105 mm. shells, H.E.	19	24.50
2500 hp. engines	96,000	110,000
Cargo winches	1,335	1,660
Anchor windlasses	4,800	6,230
Steering gear	6,300	8,475

**Small Arms Under L-286**

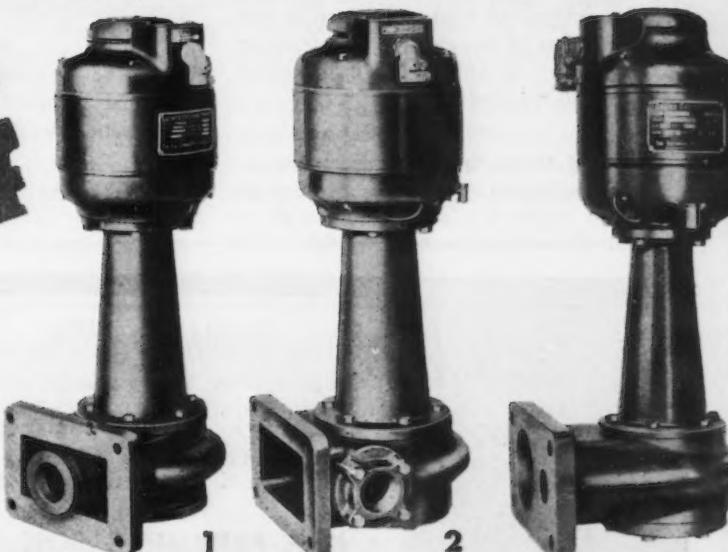
• • • Hereafter Order L-286 will govern the sale and delivery of small arms ammunition, the WPB announced on Monday.

# RUTHMAN

## Gusher Coolant Pumps

THE OUTSTANDING COOLANT PUMP TODAY

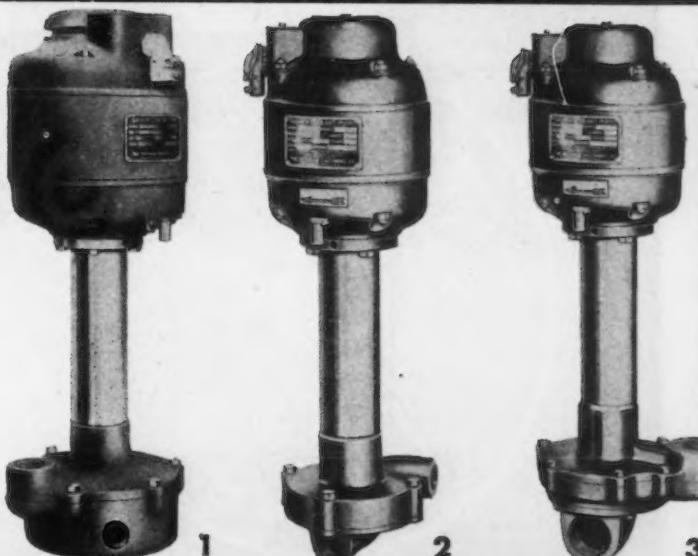
FLANGE  
MOUNTED  
TYPES



1. Internal discharge type
2. External discharge type
3. Intake and discharge through flange separately

GUSHER COOLANT PUMPS ARE MADE IN VARIOUS TYPES AND SIZES - 1/3 TO 2 H.P.

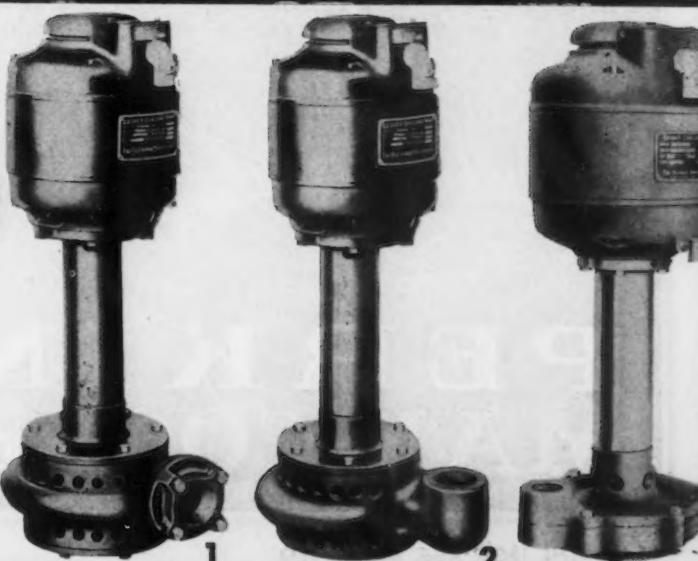
PIPE  
CONNECTED  
TYPES



1. Side intake with vertical discharge
2. Horizontal ell intake at bottom with horizontal discharge
3. Horizontal ell intake at bottom with vertical discharge

TO MEET YOUR REQUIREMENTS — CHANGES CAN BE MADE IF BLUEPRINTS ARE FURNISHED

IMMERSED  
TYPES



1. Twin Intake with horizontal discharge
2. Twin Intake with vertical discharge
3. Plain Immersed type with vertical discharge

The RUTHMAN MACHINERY COMPANY • CINCINNATI, OHIO

## CMP-PRIORITIES

### Priority Changes

• • • M-3-c—Amended order transfers control of copper for use in the production of automotive maintenance equipment to Order L-270, effective April 30. (4-29-43)

• • • M-43-b—Amended order modifies regulations prohibiting the use of

tin in the repair of gas meters. (4-27-43)

• • • M-49—Amended order places all iridium supplies under allocation, effective immediately. (5-1-43)

• • • M-63—Amended order places additional commodities under import restrictions. (4-28-43)

• • • M-81—Amended order increases

the number and quantities of food products which can be packed in cans during 1943. (4-27-43)

• • • P-89—Amended order provides that no producer of maintenance, repair and operating supplies of chemicals shall be subject to the provisions of CMP 5 and 5A. (4-26-43)

• • • E-6—Amended order gives WPB the right to modify the production and delivery schedules of hand service tools. (4-28-43)

• • • L-33—Amended order permits manufacturers of portable electric lamps to produce such articles from parts which had been wholly or partially fabricated by Dec. 10, 1942, until July 15. (5-1-43)

• • • L-217, Schedule VII—Amended order clarifies the definition of pumps. (4-27-43)

• • • L-270—Amended order places the use of copper in automotive maintenance equipment under restrictions identical with those applying to the use of steel, aluminum and other critical materials. (4-29-43)

• • • L-286—Order governs sale and delivery of small arms ammunition restricted to essential civilian users. (5-1-43)

### Price Briefs

• • • Used railroad track accessories are priced specifically by the OPA from 10 to 30 per cent below the mill prices of new accessories including used angle bars and tie plates, track bolts and spikes under Maximum Price Regulation No. 46, effective May 1. (OPA-T-790)

• • • Methods of pricing used refrigerating and air conditioning equipment of less than 25 hp., which is sold as part of the WPB program to convert such equipment for use in war industries were announced in Amendment No. 162 to Supplementary Regulation No. 14 of General Maximum Price Regulation No. 136. (OPA-2339)

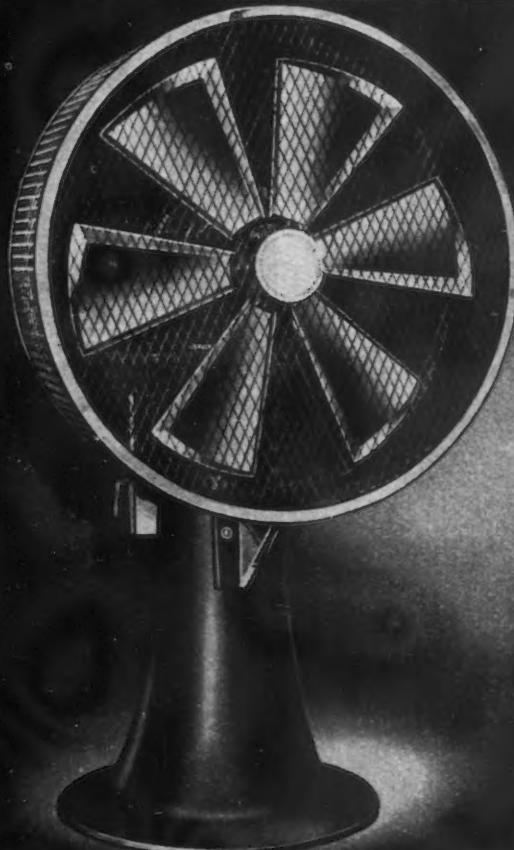
• • • Die castings now have ceiling prices under Maximum Price Regulation No. 377, Die Castings, effective May 1. (OPA-2381)

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Perkins Man Coolers keep men cool. Comfortable workers produce more. Give them a steady re-circulation of air.

Perkins Man Coolers are made in stationary and oscillating types, both portable.

**B. F. PERKINS & SON, INC.**  
Engineers and Manufacturers  
Holyoke, Mass.



# PERKINS MAN COOLERS

TRADE MARK REGISTERED UNITED STATES PATENT OFFICE

## Uniformity in Sale Terms Seen Needed

### Cleveland

• • • Conditions of sale of steel and steel products have been subject to corrections, modifications and other changes during the past several months, mainly because of reservations placed upon purchases by steel consumers. Steel producers have had to modify their conditions of sale somewhat to meet such restrictions as have been put up by steel consumers and by the government.

Greatest confusion at present, in so far as government purchases are concerned, is in the termination of contracts, with the various agencies each presenting different regulation.

*See related story on page 100.*

On the whole, they all aim at a convenient and fair means of terminating contracts, but without coordination each seeks to achieve this end by varying procedures. The coordination and correlation of these terms is being sought by Washington buying agencies, and it is expected that an "overall list of purchasing terms" will be forthcoming within the next week or two.

It is not, however, the government with which steel producers are finding it most difficult to deal. It is the individual manufacturers that have revised their terms of purchase and printed them on the back of purchase orders. Careful checks must be made of the purchase orders received to make certain that the terms agree with the individual producer's conditions of sale. When variance is found, usually the district office of the seller calls upon the buyer and submits the producer's conditions of sale unless the point in question is not specifically covered by the producer's published data. In this case, the information is submitted to the home office for consideration by the sales and legal staffs and the findings are transmitted to the buyer.

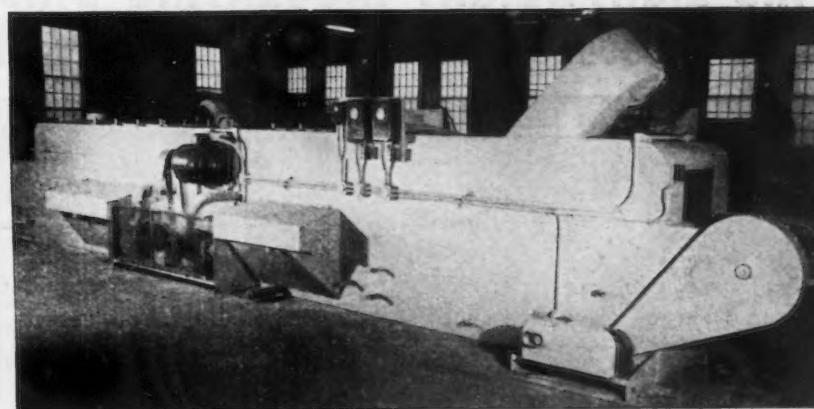
A case in point has been the subject of cancellation or modification of orders. One producer states in its conditions of sale that orders cannot be cancelled or modified, or releases held up by the buyer, after the steel is melted or in process except with the seller's consent and subject to conditions then to be agreed upon, which shall include protection of the seller against all loss. In one instance an order for material processed to the point of hot rolled bars was requested cancelled by the buyer. Negotiations disclosed that there were no other

possibilities of sale for this material, so the customer was charged the full selling price of the material to as far as it was processed, and then allowed scrap rebate, since the material would be charged back into the open hearth.

Another instance was revealed where, upon cancellation of the order, the material was fit for resale to a warehouse. In this case, the first customer had nothing to pay, as the full selling price of the material was

realized in its sale to the warehouse.

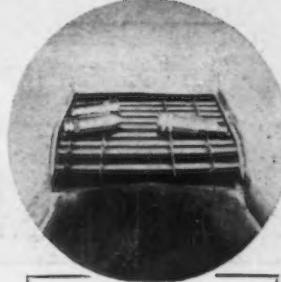
Other points, such as the use of freight rates in effect on the date of the order; rates in excess of rail rates for shipments by other means; switching and drayage charges; packaging and damage; and export sales are also covered in sellers' conditions of sale and have been subject to some discussion because of changes in conditions of purchase by buyers. Such points have to be agreed upon by both the buyer and seller, and sellers have been holding out for their own terms.



***The Quickest Way  
at Lowest Cost***

## RANSOHOFF EQUIPMENT

**For Washing, Rinsing, Drying  
STEEL CARTRIDGE CASES  
OR PROJECTILES  
... any size ...**



*This machine handles anti-aircraft steel shell cases between draws and for final cleaning operations on finished cases.*

Numerous types designed for exacting, continuous, dependable work . . . or, for special tasks which require special engineering. Get information and estimates on Ransohoff Equipment for washing, rinsing, drying steel cartridge cases or projectiles between draws and for final operations before painting and lacquering; for delicate machined parts in baskets; for large, fragile work directly on conveyor belts.

## RANSOHOFF EQUIPMENT

also for cleaning,  
pickling, lubricating  
between draws, bond-  
eriting and parkeriz-  
ing.

**N. RANSOHOFF, Inc.**

1315 Township Ave.  
CINCINNATI, O.

## OCR Not to Check Separate Agency

### Washington

• • • Creation by WPB Chairman Donald M. Nelson of a new Office of Civilian Requirements with broad powers under Arthur D. Whiteside as director probably will not, according to prevailing opinion, checkmate passage of the bill of Senator Maloney, Democrat of Connecticut, to set up a civilian supply administration

entirely independent of WPB. Under the Maloney measure Economic Stabilization Director James F. Byrnes would be the final authority in deciding conflicts with military needs. So strong is sentiment in Congress for the establishment of an independent civilian administration with authority equal to that of military claimants that it is widely pre-

dicated the Maloney bill could be passed even if it were vetoed by the President.

The authority given Mr. Whiteside, though it is much greater than that heretofore granted Joseph L. Weiner of the former Office of Civilian Supply and despite the ability of Mr. Whiteside does not appear to satisfy Congress. It wants a setup that is removed completely from WPB jurisdiction and want it to have even more power than was conferred upon Mr. Whiteside, who retains his title as WPB Vice Chairman in charge of civilian supplies. He was appointed on April 15.

Under the order establishing the Office of Civilian Supplies, Mr. Whiteside was given control over all consumer goods and services, except food, housing and transportation. He also superseded Rubber Director William M. Jeffers in authority to allocate rubber for civilian use. Moreover, he was authorized to determine rationing policies and to issue directives to OPA.

Mr. Whiteside was made a member of the Civilian Requirements Policy Committee, which, in addition to him, consists of Secretary of Agriculture Wickard, Price Administrator Brown, Petroleum Administrator Ickes, Defense Transportation Director Eastman and War Manpower Chairman McNutt.

Authority was given to Mr. Whiteside to require WPB's Industry Division to carry out his orders and to review any WPB orders affecting any industry "to assure such orders given full consideration to civilian needs."

### Priority Group Formed To Exchange Information

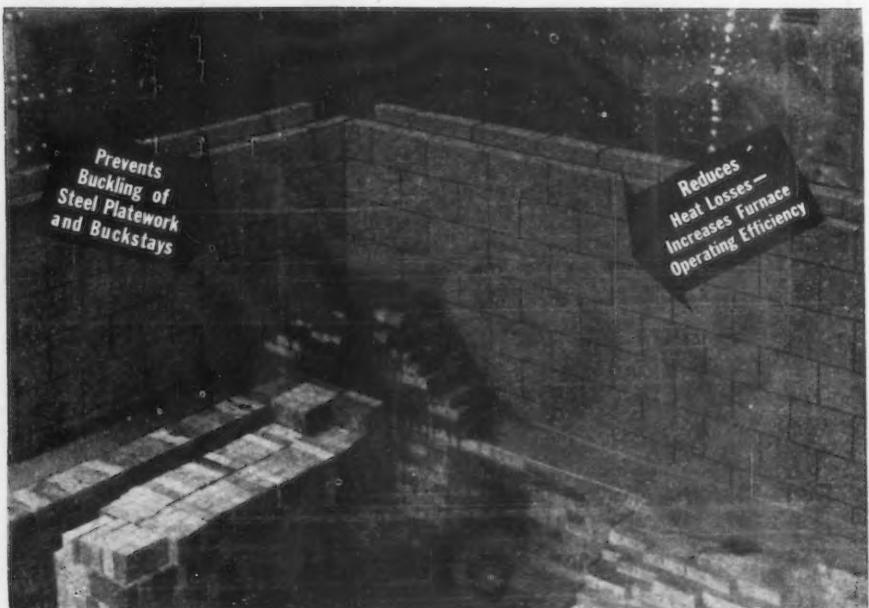
Detroit

• • • Indicative of the widespread interest and concern over priorities problems in the Detroit manufacturing area, the Priority Association of Detroit has been formed, to obtain up to date advices on changing priority problems and to interchange information.

J. M. Bullis, of Byrne Doors, Inc., has been elected president. M. D. Wallace, of Parker Rust-Proof Co., has been named vice-president; Gaston J. Block, of the Research Institute of America, is secretary; and Miss Ida M. Libby, of Reliance Electric and Engineering Co., is treasurer.

More than 100 members and guests turned out for the first formal meeting of the organization late in April.

## This LIGHTWEIGHT INSULATING BRICK Does "Double Duty" in Furnace Walls



### Other forms of THERM-O-FLAKE INSULATION

**Coating** — Seals and insulates all types of furnace walls. Highly plastic, works and spreads easily.

**Blocks** — Highly efficient insulation where larger size units may be required.

**Concrete** — Monolithic castable insulation with high insulating value.

**Granules** — Loose-fill, efficient insulation, weighs only 6 pounds per cubic foot.

### CONVENIENT 13½ x 9" SIZE— EASY TO HANDLE— REDUCES WALL JOINTS 65%

Protects furnace steelwork and plating from excessive heat with a strong resilient cushion which absorbs expansion stresses.

#### KEEPS HEAT INSIDE FURNACE WALLS

Excellent insulation,—a 4½ inch thickness being equivalent in heat flow resistance to more than 29 inches of fire brick.

Find out how quickly THERM-O-FLAKE Brick will pay back their cost in reduced furnace heat losses. For specific data, indicate type of furnace and approx. operating temperatures in writing to:



### Therm-O-flake BRICK

FOR HOT FACE TEMPERATURES UP TO 2000° F.

## WPB Reorganized to Conserve Materials

### Washington

• • • To establish a parallel relationship between the conservation of materials and conservation in end-product manufacturing operations, the Conservation Division of WPB has been divided into two primary branches—Materials and Products.

According to Howard Coonley, Division Director, this horizontal separation within the division does not change the operational functions. The three main functions—materials substitution, product specifications, and product simplification—remain as the primary operating objectives of the division and will be projected across the two major branches. Thus, these operations will relate directly to materials and to products, and will clear through the various technical consultants working with specialized industrial fields.

New supervisory assignments have been designated for the men who formerly headed up the three operational branches. Harvey A. Anderson, formerly Chief of the Conservation and Substitution Branch, becomes Deputy Director of the Division; C. L. Warwick, who has served as Chief of the Specifications Branch, becomes Chief of the new Materials Branch, while R. B. Sheppard, formerly Chief of the Simplification Branch, becomes Chief of the new Products Branch.

### WPB Restricts Bulk Conveyors in L-287

### Washington

• • • Affecting 32 manufacturers whose 1943 output is estimated at 4000 to 5000 machines WPB on Monday issued Order L-287 providing strict control of production and delivery of portable conveyors to move bulk materials. The order restricts acceptance or delivery of portable conveyors or parts to those covered by approved purchase orders.

An "approved order" is a purchase order bearing a preference rating of AA-5 or higher if placed with or accepted by a manufacturer or dealer on or after May 10, or an A-1-c or higher rating if before that date. Purchase orders for the armed forces or other government agencies specifically named in L-287 automatically become approved orders.

The new order also provides that on and after June 9, no person shall manufacture, deliver or accept the delivery of any portable conveyor or parts, unless manufactured in accordance with specifications and restrictions on the use of materials as prescribed in Schedule A attached to L-287. This restriction, however,

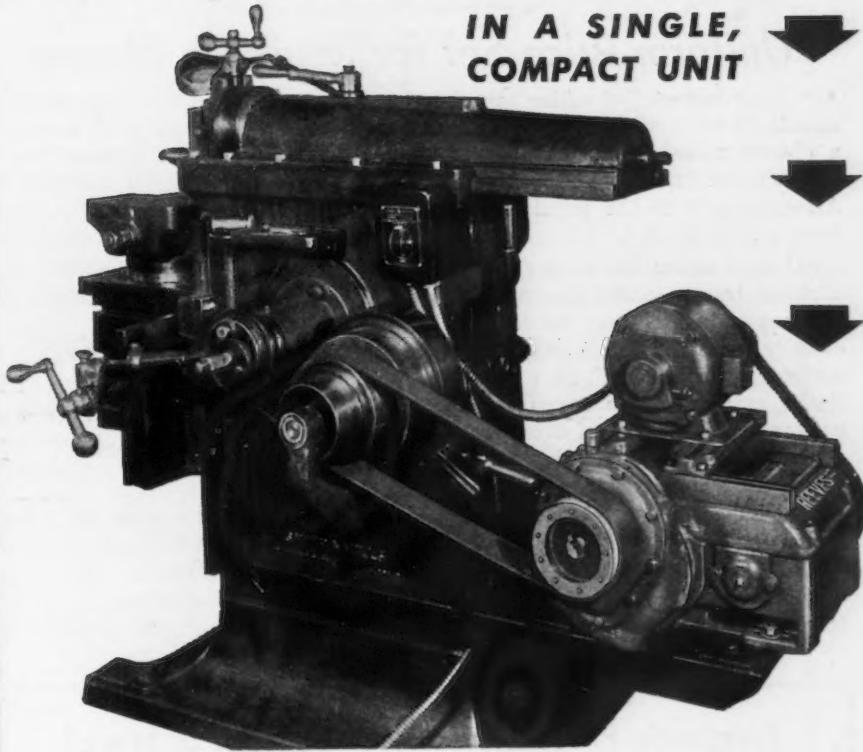
does not apply to conveyors or parts manufactured before May 10, to a point where other use of the particular item is impracticable. Neither does it apply to any purchase order accepted by the manufacturer prior to May 10, and delivered before June 9. Restrictions on orders for repair and maintenance parts do not apply to any order of such parts for the necessary maintenance or repair of

any portable conveyor in an amount not exceeding \$300 for any single portable conveyor.

Schedule A specifies the amounts of critical materials that may be used in certain types and sizes of portable conveyors. It also prohibits the six so-called luxury features (power raising and lowering devices, rubber tired wheels, etc.) which are often made part of a conveyor but are not actually necessary to move and store bulk materials.

## Stepless Speed Variation and Speed Reduction . . .

IN A SINGLE,  
COMPACT UNIT



\* \* \* Pictured here is a REEVES Reducer-Type Transmission, horizontal design, with individual motor drive, applied to a shaper. With this new REEVES drive, which consists of the famous REEVES Variable Speed Transmission and built-in, helical-type speed reducer, the operator of any production machine has a wide range of low driving speeds instantly available in a single, compact unit. Entire range is covered without steps or jumps. Any required speed is accurately obtained by turning handwheel—without stopping driven machine. Easily equipped for individual motor drive by means of REEVES adjustable motor base, which accommodates any available motor. Catalog ITR-432 gives full details of this new REEVES drive. Write for it.

REEVES PULLEY CO., COLUMBUS, INDIANA

## REEVES SPEED CONTROL

## OPA Clarifies Bolt, Nut Export Price

**Washington**

• • • How the Second Revised Maximum Export Price Regulation, which was effective April 5, 1943, applies to export prices of bolts, nuts, screws, and rivets is explained in a detailed letter sent to producers of these articles by OPA on May 3.

Other than allowing the addition of the excess cost of special packing over the cost of standard export packing when special packing is specified by the buyer, the revised regulation makes no change in the maximum prices of producers of bolts, nuts, screws and rivets, for Lend-Lease sales, the letter points out.

The maximum "domestic prices" used in the Revised Export Regula-

tion include the so-called export list prices and discounts of the bolt, nut, screw and rivet industry since those list prices and discounts have been customarily used in domestic sales of some products packed for export. The principal examples of these domestic sales in the past were sales to export merchants located in the United States, it is explained.

When a procurement agency specifies a packing more costly than the applicable standard packing used in the trade between Oct. 1 and 15, 1941, the seller may add the increase in his cost of direct labor and materials to the maximum domestic price applicable to the transaction, the letter states.

## Uniform Price Set for Reusable Shapes

• • • An economy in selling reusable structural steel shapes is effected in a change made May 3 by the OPA in Maximum Price Regulation No. 310. Amendment 1 to the regulation, effective May 8, 1943.

Salvaged assemblies of steel shapes, such as trusses and built-up beams, columns and lintels, are included specifically in the definition of "reusable structural steel shape." This automatically assigns to the assemblies the uniform ceiling price of 2.75 per lb. established in the regulation for disassembled members; but permits seller and buyer to gain the advantages that follow when the buyer can use the steel as assembled.

Another change exempts the dealer from rendering detailed invoices to

buyers for sales of the reusable steel amounting to no more than \$1.00. A number of sales consist of small pieces of bar or other material and may be for sums no greater than 50 or 60c. OPA agreed with dealers that recording such sales in the detail specified in the regulation imposed an undue burden on the trade.

## Transportation Granted Adequate Repair Stocks

**Washington**

• • • Inventory Direction No. 7 was issued under CMP Regulation No. 2 on Monday by WPB to insure the maintenance of adequate stocks of materials for emergency repairs by

transportation systems. This direction permits an operator to maintain materials for emergency repairs to the extent authorized by the WPB Transportation Equipment Division under Preference Rating Order P-142, the order under which operators of transportation systems acquire their materials, including emergency stocks.

## Electric Furnace Practice Discussed At Chicago Meeting

**Chicago**

• • • A spirited discussion of electric furnace practice featured the one-day meeting of the Chicago section of the Electric Metal Makers Guild held here last Saturday. Some 100 members and guests attended the session.

Discussions covered both ingot and casting steel and included refractories, bank build up, recarburizing, elimination of sulphur, fluorospar, boron additions, etc.

The meeting was arranged by a committee consisting of Herman B. Schulz, superintendent of electric furnaces, South Works, Carnegie-Illinois Steel Corp.; B. J. Aamodt, superintendent, National Malleable & Steel Casting Co., Chicago, and A. J. Scheid, metallurgist, Columbia Tool Steel Co., Chicago Heights. Harry F. Walther, Timken Steel & Tube Division, national president of the guild, also participated.

The guild's annual meeting is to be held in Canton, Ohio, June 4 and 5.

## Steel Released for Vaults

**Washington**

• • • WPB on Monday continued for another 60 days the use of iron and steel for reinforcing burial vaults, in an amendment to Order L-64. Previously, use of iron and steel for this purpose had been ordered stopped on May 3. Also, the new amendment increases by 3 in. the length of octagon, flaring, square and institution types of caskets. The previous limitation was 6 ft.

## Beehive Coke Max. Price Set at \$8.10 Per Net Ton

• • • The price for beehive oven foundry coke has been set at \$8.10 per net ton when sold by producers in Fayette County, W. Va., under Amendment 13 to Maximum Price Regulation 121. Anyone may buy or receive coke at this maximum price, which is set f.o.b. at the ovens. The ruling becomes effective May 7.

## Electrode Production 96,000,000 Lb. in March

**Washington**

• • • Production of shielded arc electrodes is increasing steadily and is now slightly in excess of current consumption needs, the WPB General Industrial Equipment Division announced last week. March production totaled 96,000,000 lb., valued at approximately \$10,000,000, compared with 30,000,000 lb. in January, 1942, and 80,000,000 lb. in January, 1943. The average price of electrodes is 10c per lb.

The industry's backlog at the end of March represented an averaged of four months' production at the current rate, a notable improvement over the January backlog of from six months' to a

year's production at the January rate.

Peak requirements for arc electrodes are estimated at 95,000,000 lb. per month. It is expected production will continue to increase until June, when peak output of 110,000,000 lb. is scheduled to be reached.

In the Jan. 7 issue of THE IRON AGE it was predicted that electrode production would be brought in balance with requirements. The fact that production was lagging behind requirements during all of 1942 overshadowed all other problems of the industry last year. Three completely new plants have been brought into production since December.

NEWS OF INDUSTRY

## Ore Quota Requires Shipments Of 12½ Million Tons Per Month

### Cleveland

• • • With the 1943 lake shipping season getting under way just within the past week, which is more than a month later than last year, there is some speculation as to whether or not this year's 94,000,000 gross ton quota of ore can be achieved, and if so how. With an 8½-month shipping season in 1942, and with practically the entire fleet of more than 300 boats in operation all year, ore shipments totaled 93,495,392 gross tons of which 1,410,068 tons were shipped all-rail. Prior to that, the previous record, set in 1941, was 81,210,606 gross tons.

In considering how the 1943 all-time high quota will be met, there are two important factors to be considered. The first is the addition of five new boats late last season to the Pittsburgh Steamship Co.'s fleet for use the entire season this year, and the addition of at least 12 Maritime Commission boats that are now under construction for at least part of the season. The second consideration is that these new boats all will be able to load to capacity for the down-lake trip after July 4, when the new MacArthur locks will be completed at the Soo. Heretofore, the best they could carry was about 14,000 tons and clear the old locks, but after the opening of the new locks they will be able to carry between 16,000 and 18,000 tons per trip.

The accompanying table shows iron ore shipments from the Lake Superior region by mining companies as compiled by *Skillings' Mining Review*. Based on these figures, the percentage of ore shipped by each company to the total shipment has been calculated in an effort to determine each company's required contribution to ore stockpiles this year to meet the quota. Also, the last column in the table shows the approximate monthly shipments required based on a 7½ month shipping season that will carry through to about Dec. 15, to meet the quota. This figures to about 12,515,000 gross tons per month.

With the shortened shipping season, however, there is very little likelihood that many of the minor producers will be even able to meet their last year's down-lake deliveries. Consequently the burden of the increase in the quota plus the deficit caused by

some small producers will have to be made up by the larger producers.

There is one unknown factor in ore shipping on the lakes this year and that is how much use can be made of the Maritime Commission boats. At present there are only four of these boats in the water, and only one has had its trial run.

COMPANY	Number of Mines Operated in 1942	1942 Shipments, Gross Tons	Per Cent of Total Shipments	Required 1943 Shipments to Meet Quota, Gross Tons	Shipments Per Month Based on 7½ Mo. Season to Meet Quota, Gross Tons
Oliver Iron Mining Co.	35	40,862,020	43.704	41,081,760	5,448,000
Pickands, Mather Co.	27	17,853,561	19,095	17,949,300	2,394,000
Cleveland Cliffs Iron Co.	12	7,497,077	8,017	7,535,980	1,005,000
The M. A. Hanna Co.	18	4,877,906	5,217	4,904,980	655,000
Jones & Laughlin Steel Corp.	3	4,143,231	4,431	4,165,140	558,000
Butler Bros.	13	4,092,800	4,377	4,106,680	548,000
Republic Steel Corp.	6	2,755,556	2,947	2,800,180	374,000
Evergreen Mines Co.	20	2,630,882	2,8103	2,641,820	353,000
Ogelbay, Norton & Co.	2	1,832,916	1,9804	1,842,770	246,000
North Range Mining Co.	4	1,589,961	1,7005	1,586,470	214,000
Snyder Mining Co.	3	1,298,876	1,389	1,306,360	175,000
International Harvester Co.	3	943,268	1,0079	947,422	124,000
Inland Steel Co.	5	900,283	0,962	904,280	121,000
Algoma Steel Corp.	1	486,666	0,5205	489,270	66,000
Wheeling Steel Corp.	2	383,203	0,409	384,460	52,000
Pittsburgh Coke & Iron Co.	5	361,487	0,387	363,780	49,000
Charleston Iron Mining Co.	2	223,527	0,239	224,660	30,000
Argonne Ore Co.	3	216,552	0,231	217,140	29,000
E. W. Coons Co., Inc.	6	173,978	0,188	174,840	24,000
Coates and Tweed	1	110,816	0,1185	111,390	15,000
Carl Hedman & Co.	2	85,186	0,0911	85,634	12,000
Globe Iron Co.	2	64,305	0,0687	64,578	9,000
Jackson Iron & Steel Co.	1	40,554	0,0437	41,078	6,000
Miscellaneous	8	71,001	0,0759	71,346	10,000
TOTALS	184	93,495,392	99.9785	94,013,300	12,515,000

### GOODS WE HAVE LEND-LEASED FROM MARCH 1941 THROUGH MARCH 1943

#### AIRCRAFT



#### FOODSTUFFS



#### AMMUNITION



#### TANKS



#### WATERCRAFT



#### METALS



#### ORDNANCE



#### MOTOR VEHICLES



#### PETROLEUM PRODUCTS



#### MACHINERY



EACH SYMBOL  
REPRESENTS  
\$100,000,000  
OF GOODS

## Foundrymen Review First Year of War

(CONTINUED FROM PAGE 71)

more constant was stressed by a representative of an aircraft company. This foundryman reported that his company had gone so far as to set up standards for vendors' products.

In addition, this company makes a practice of running a series of tests on each new batch of raw material to establish the optimum baking temperature and time.

At another informal discussion of the aluminum and magnesium division, it was reported there had been some experimentation with the use of zircon sand as a chill in magnesium cores. Cast iron, malleable, copper, etc., are being successfully used as chills.

what restricted value owing to the limited sensitivity and contrast available as compared with those obtainable by radiography (photographic method).

In addition, much greater potential is necessary in fluoroscopy to produce the required visible intensity on the screen than is required for radiography.

These considerations limit the use of fluoroscopy so far as casting sections are concerned, to aluminum and magnesium alloys, and definitely restrict its scope for even these metals.

However, where fluoroscopy is feasible, some of the major items of cost of X-ray examinations are avoided or

reduced. Cartwright amplified this by saying that in the Mitchell company laboratory, where radiographic inspection involves the examination of 400 to 1000 castings of various shapes daily, as much as \$15 to \$40 a day in film costs is saved. This compares with a maximum expenditure of \$200 for accessories necessary to permit screening.

"Steel, copper alloys and other heavy metals are, in general, not suitable subjects for screening . . . Very minute flaws, such as intercrystalline porosity cannot be detected with certainty by screening."

The specification further states that screening is not acceptable where the casting cannot be moved about in the beam.

In Canada, radiological inspection of aircraft castings does not include acceptance of castings by screening in any category or degree.

This does not, however, preclude its use as a preliminary control method

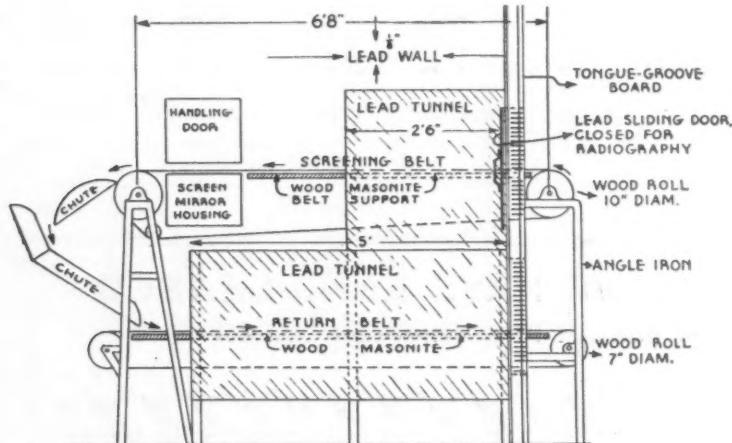
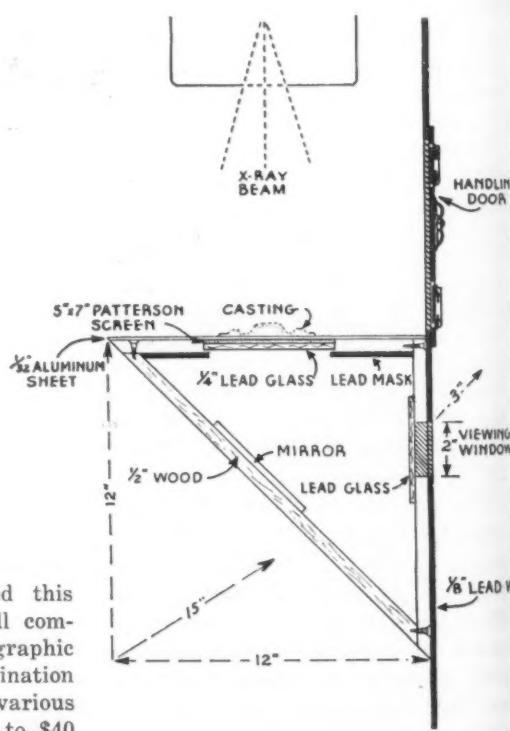


FIG. 1—Sketch on left shows arrangement of screen equipment for a 220 kv. installation, while sketch on right is a section view of mirror housing.



It was stressed that care must be taken to avoid over chilling, a situation most possible when using copper chills. Sandblasting of chills after each use was recommended as a means to avoid chill blows due to condensation on the chill.

Coincidental with the increase in the use of light alloy castings, especially in aircraft work, has been the need for speeding inspection methods, as well as perfecting the technique of inspection. An interesting contribution to this subject was made by A. E. Cartwright, metallurgist, Robert Mitchell Co., Ltd., Montreal, who described the possibilities of direct visual X-ray examination by use of a fluoroscopic screen.

Cartwright pointed out that the use of fluoroscopic methods as applied to examination of castings is of some-

reduced. Cartwright amplified this by saying that in the Mitchell company laboratory, where radiographic inspection involves the examination of 400 to 1000 castings of various shapes daily, as much as \$15 to \$40 a day in film costs is saved. This compares with a maximum expenditure of \$200 for accessories necessary to permit screening.

The speaker said that screening is more widely used in Europe than in this country and quoted excerpts from a specification of the British Air Ministry covering radiographic inspection. The Ministry's report commented, in part, as follows: "Suitable castings may be examined by screening within the limits imposed by their shape and size, and with regard to the suitability of X-ray equipment. Light alloy castings having a maxi-

imum cross section of 2 in. in any part and of such shape that manipulation will allow the X-rays to penetrate every part of the specimen so that a readable shadow is produced on the fluorescent screen, are suitable specimens for examination by screening.

"Steel, copper alloys and other heavy metals are, in general, not suitable subjects for screening . . . Very minute flaws, such as intercrystalline porosity cannot be detected with certainty by screening."

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## FEATURE CONTINUATIONS

was said to be in the larger focal spot size of the tube, but it was found that this has no noticeable effect on the sensitivity obtained in screening.

The 220 kv. equipment is installed in a lead lined space 10 ft. square, with the walls consisting of  $\frac{1}{8}$  in. lead sheets. Lead sheets  $\frac{1}{4}$  in. thick are placed under a soft wood flooring. The screen is 8 x 10 in., while the screen belt is of 3-ply interwoven cotton, 1 ft. wide. The return belt is similarly constructed. The rolls are of wood.

Faulty castings are pushed off the belt by means of a rake controlled by the viewer. The viewer also manipulates a handwheel connected to the roller to position the casting under the ray.

Sensitivity attainable is at about 10 per cent. However, constant practice, in conjunction with the most favorable section thickness and ideal viewing conditions will frequently result in sensitivity down to 5 per cent.

The personal factor in screening was described as one of the most significant. The target-screen distance is held between 18 to 30 in.

Screening, to date, is ineffective for the detection of minute gas pockets of less than about 10 per cent of the section thickness and also for fine shrinkage, internal hot tears, pinhole porosity, and small sand or slag inclusions.

The author did not advocate fluoroscopy for acceptance inspection except when in the most competent and conscientious hands. It is greatly inferior to radiographic inspection, he said, for the various reasons previously noted and, above all, because of the absence of the tangible record provided by the radiographic film.

In the discussion that followed Cartwright's paper, L. W. Ball of Triplett & Barton, Inc., Burbank, Calif., remarked that the use of radiological inspection had made it possible to reduce the safety factor of aircraft castings from 10 to 2, and efforts are now being made to reach 1.4.

In answer to a question from the floor, Cartwright commented that there was not enough difference in density of magnesium and aluminum to enter into the 10 per cent sensitivity figure. However, sensitivity is a little less with magnesium, as there is less contrast between the metal and the voids.

The discussion finally closed with the rather unexpected announcement by a WPB representative that the WPB was interested in increasing magnesium foundry capacity and he asked that any foundryman interest-

ed in converting to magnesium get in touch with him.

At an earlier meeting of the aluminum-magnesium branch, a discussion of inspection methods brought forth the statement from a prominent metallurgist associated with an eastern aircraft parts foundry that black light inspection (Zyglo, developed by Magnaflux Corp.), was proving to be an effective method of locating defects not visible to the naked eye. He added that it is not effective for indicating defects below the surface. However, for such defects as pinhole porosity, etc., he recommended the method highly. It was also pointed out that AMS and some other specifications were now calling for black light inspection under certain conditions.

The magnesium founders also showed considerable interest in a discussion of the use of 28 per chrome for a melting pot. It was reported that the magnesium does not attack 28

per cent Cr steel, but the No. 230 agent appears to seek out defects in the pot and works through these, scaling on the outside.

The difficulty of obtaining a straight Cr pot had led to experiments with Cr-Ni pots, but it was found that enough Ni was picked up to be detrimental to aircraft castings. Consideration is now being given to a pot of clad steel construction.

Another discussion was concerned with the temperature to which an aluminum casting can be raised safely for straightening. The general feeling seemed to be that such castings should be straightened in the solution heat treated stage, as it became very difficult to straighten after ageing.

However, if the need for straightening is found, say after the inspection, the casting should be given a short treatment of 2 hr. at solution heat treating temperature to soften, then straightened, then reaged.

## New Trends in Steel Casting Production

SEVERAL interesting developments were reported by the Committee on Methods of Producing Steel for Castings which has C. E. Sims as its chairman.

Cast armor was described as an outstanding success. It has been shown that satisfactory steel for armor can be made by both acid and basic practices and in either electric or open hearth furnaces.

The side blow converter is becoming "legitimized," the report said. The converter, in conjunction with already available cupolas, has proved to be the quickest and cheapest way of expanding steel casting facilities. The successful adaption of the electric eye to the side blow converter has greatly facilitated control of composition.

The Sesci type rotary fuel fired furnace, which is similar to the Brackelsburg furnace, has apparently had some measure of success in England, the report said. While no data on the economy of this type of furnace is available, it was said that the quality of the steel produced was on a par with other processes.

Two principles in preparing steel for castings which appear to be firmly established each year are (1) the desirability of an oxidizing period or boil in each heat, and (2) the undesirability of holding steel in the deoxidized condition for prolonged periods.

It was also stressed that in making

additions of deoxidizers to the ladles, only that part which gets into the steel counts. This remark was prompted by recent experience in several plants which indicated that the addition noted on the heat record may bear little relation to the actual deoxidation.

The report also said that much concern is being felt over the increasing contents of sulphur and phosphorus in available scrap. Acid melters, in particular, are being pushed to the ragged edge of specifications and much thought is being given and considerable experimental work is being done on means of circumventing these elements. Some plants, it was said, are changing to basic practice because of these two elements.

A report on the present status of the side blow converter, made by A. W. Gregg of Whiting Corp. and F. B. Skeates of Link-Belt Co., revealed that since July, 1940, some 45 new converters have been put into operation in the United States and Latin America. A recent survey showed 66 converters operating in the United States and Canada, located in 37 different foundries.

The report also commented that while exact data were not available, correspondence with English foundrymen indicates that converters are finding wide use abroad. One letter commented that a possible two-thirds of the steel castings made in England

are being made by the Tropenas converter. "Quite a number of firms," one letter said, "have thrown out large Siemens furnaces and put in 3 to 4-ton converters.

While for many years converters used in America were of 1 or 2-ton capacity, the trend is now toward larger capacities, with four 6-ton furnaces now in operation.

Gregg and Skeates also reported on several recent improvements in the electric-eye control as applied to converters. They noted that 33 complete installations had been made in 17 different foundries in the past year. The use of this control was said to have reduced blowing loss in some cases by 25 per cent and more and had improved lining life. The simplicity of the operation of the electric eye was indicated by the fact that in two foundries women are being used to blow steel.

The report also revealed that royalty payments for the use of the electric eye for control of converter operations are being discontinued.

Touching upon recent improvements in control equipment, the authors said that the tilting mechanism had been made more sturdy and dependable and that regulation of blast pressure during the blow is now controlled by motor-operated butterfly valves operated by a controller in the operator's pulpit. Another recent improvement is an electric indicator for the blowing angle which records the angle on a dial in the blowing stand.

Desulphurizing was said now to be on an established basis, with practically all converter foundries producing steel with 0.04 S or less, and some reporting 0.03 and one 0.025 S.

Phosphorus removal, however, has not been so satisfactorily developed. In addition to the Yocom method for dephosphorizing, another method was reported, one developed by M. J. Uty of the Chromium Mining & Smelting Co. Uty's method is primarily a modification of the Yocom process.

The Ford Motor Co., it was said, has successfully dephosphorized in a cupola by using a basic lining and a basic slag.

Advances are also being made in increasing lining life. While at one time 25 blows on a lining was considered good performance, records of up to 60 blows are now available, with one report of 80 blows.

The report of the radiographic committee of the steel division showed a further increase in the number of foundries using this method of inspection. In addition, it was pointed out, the government has purchased

additional radium capsules and X-ray apparatus for casting inspection. Several steel foundries were reported to have installed million-volt X-ray equipment.

The committee's report noted an

increase in literature on X-ray technique. It also touched upon the new radiographic standards issued by the Bureau of Ships to replace the gamma-ray standards of the Bureau of Engineering.

• • •

## Hydrogen and Nitrogen in Ferrous Castings

**A**NOTHER contribution to the recent but fast growing literature on the behavior of hydrogen and nitrogen in metal was the paper by C. A. Zapffe and C. E. Sims of Battelle Memorial Institute entitled "Hydrogen and Nitrogen as Causes of Gassiness in Ferrous Castings."

In shop parlance, the paper reported on a study of the relationship between hydrogen and nitrogen and the phenomenon of the ejection of gas during late stages of solidification in castings of supposedly dead metal.

By definition, the carbon-oxygen reaction as an important gas producer in the phenomenon becomes excluded as a cause. For, in the first place, the high percentage of metallic deoxidizers present in most killed ferrous metals would seem to prevent carbon from reacting with oxygen that might remain. In the second place, should the carbon react with some oxygen, it seems impossible to explain such extensive gaseous effusions upon the amount of carbon oxide that might form.

Finally, actual analyses of the gases given off by such metals during solidification do not show important quantities of carbon oxides.

Eliminating oxygen as a producer of an abundant gaseous phase, there remains only hydrogen and nitrogen as possible sources of the phenomenon.

The experiments to demonstrate the effects of these two gases were made with cast iron having such a high silicon content (15 per cent) that the chemical activity must have been negligible. Various types of iron were poured into several types of molds.

The conclusions drawn from this research were, briefly, as follows. In ordinary practice, both in iron and steel, gassiness is primarily a function of the hydrogen content and the changes in the solubility of this gas experienced during solidification. Other gases, if present in the evolution, are usually compounds of hydrogen or are incidental components.

Hydrogen alone, however, cannot form a bubble. Another agent is necessary. That agent is probably the product of a hydrogen-oxygen re-

action in most cases, but may also be other reaction products, or foreign materials within the melt.

Hydrogen may be introduced into the liquid metal by numerous well recognized means, the commonest carrier being moisture. In sand castings, one of the commonest sources of that moisture is the mold.

Austenitic steels, such as nickel steels, are generally less liable to gassiness because the solid metal is a good solvent for hydrogen; in ferritic steels gassiness is aggravated because solid metal is a poor solvent.

Austenitic steels also tend to evolve less gas because the range of gamma lattice structure, a good solvent for hydrogen, approaches the solidus, either erasing the poorly solvent delta range or aiding the evolution to bridge over delta's narrowed position. Ferritic steels, conversely, so stabilize delta iron that the solubility decrease upon solidifying is a maximum.

The addition of deoxidizers tends to enhance hydrogen absorption because hydrogen itself is a strong deoxidizer. Consequently, minor deleterious effects from additions of manganese, silicon, etc., may be observed by decreasing the oxygen activity of the steel they increase its capacity for absorbing hydrogen in accordance with the simple equation for the H-O equilibrium. Minor effects from other elements conform to the same reasoning, or to the fact that some are themselves prolific carriers of moisture or of hydrogen.

In certain exceptional cases, principally confined to alloy steel making, nitrogen itself may cause gassiness and bleeding when present in excessive amounts. The necessary concentrations depend largely upon the steel and the stability of its nitrides. Excessive absorption is much more easily attained when solid nitrides are added to the melt—as in the use of high-nitrogen ferrochromium—than when the melt is simply exposed to gaseous nitrogen. In such cases, the nitrogen may be stabilized or killed by adding a nitride-forming element such as titanium, whereupon gassiness will not occur.

# PERSONALS

• **G. Donald Spackman** has been elected vice-president in charge of operations of Lukens Steel Co. Since January 6, 1941, Mr. Spackman has been general manager of Lukens Steel and its subsidiaries, By-Products Steel Corp. and Lukenweld, Inc. In 1917, Mr. Spackman joined Lukens, serving in the mechanical department and in 1920 he was appointed fuel engineer for the company, serving in that capacity until 1925 when he was appointed superintendent of the flanging department. In August, 1929, Mr. Spackman was appointed assistant general superintendent of Lukens. When Lukenweld, Inc., was formed in May, 1930, Mr. Spackman was elected president. In 1936 he was appointed general superintendent of Lukens.

• **John A. Stephens** has been appointed vice-president, industrial relations, of the United States Steel Corp. of Delaware.

Mr. Stephens since 1938 has been director of industrial relations, and in February, 1942, was elected a member of the board of directors and the executive committee of the United States Steel Corp. of Delaware. He had come to Pittsburgh from Chicago in 1938, from his former position as manager of industrial relations, Chicago district, Carnegie-Illinois Steel Corp.

• **William F. Wise**, executive vice-president of Aviation Corp. and president of the American Propeller Corp., has been elected to the directorate of the National Tool Co., Cleveland. **Edward G. Hardig** has been appointed sales manager of National Tool. For the past 11 years he has represented the company in the Detroit district.

• **Dr. Bernard P. Planner**, who was a senior consultant for the Board of Economic Warfare in Washington, is now associated with the National Tube Co., Pittsburgh, as a member of its research staff. Dr. Planner will do occasional consulting work for the War Department, Services of Supply, Washington, for whom he has been appointed a consultant in metallurgy.

• **Gunnar Jensen**, former chief engineer at the Walker-Michigan division, Jackson, Mich., of the Walker Mfg. Co., Racine, Wis., has been appointed chief engineer of all Racine operations of the firm. **C. S. McCann**, who

was with the Delco division of General Motors Corp. at Melrose Park, Ill., has been appointed to the newly created position of director of engineering research for Walker.

• **John R. Padesky**, general manager of the Moto-Meter Gage & Equipment division of the Electric Auto-Lite Co., LaCrosse, Wis., has been elected a vice-president of the parent company.

• **Robert W. Pugh**, assistant superintendent, has been appointed superintendent of the coke oven department, Bethlehem Steel Co., Lackawanna, N. Y. He succeeds **Benjamin W. Winship**, on leave because of illness. **Robert W. Graham**, assistant superintendent in the electrical department, has been advanced to superintendent, succeeding **Frank D. Egan**, also on sick leave. **Walter J. Widmer** has been named coke assistant superintendent and **Theodore O. Zittel** electrical assistant superintendent.

• **Carl King** has been made general superintendent of the Wickwire Spencer Steel Co., Palmer, Mass., plant, and **F. G. Lindstrom**, superintendent of manufacturing operations.

• **W. H. Dodge**, former supervisor of the rate bureau of the western district, U. S. Steel Corp. subsidiaries, has been made general supervisor. Mr. Dodge has been with the Steel Corporation subsidiaries since 1907 when he was first employed as a rate clerk in the traffic department of the American Steel & Wire Co. **H. W. Huebner**, who has been assistant supervisor of the rate bureau, succeeds Mr. Dodge as supervisor of this bureau.

• **James W. Stewart** has been named Philadelphia regional chief of the Industrial Salvage Branch and **Godfrey Wetterlow** regional chief of the General Salvage Branch of WPB. Mr. Stewart formerly was assistant regional chief of the Industrial Salvage Branch in Philadelphia and was active in the salvage drive sponsored by the American Newspaper Publishers Association, and in the volunteer salvage drive last fall. Mr. Wetterlow has served for the past year as a specialist on tin can collections in the Tin Unit, General Salvage Branch of WPB, Washington.

• **Thomas N. Armstrong**, metallurgist with the development research department of the International Nickel Co. since 1935, is now also a part-time member of the staff of the War Metallurgy Committee of the National Academy of Sciences—National Research Council. Mr. Arm-

strong was employed by the Andrews Steel Co., Newport, Ky., and as metallurgist in the Norfolk Navy Yard, Portsmouth, Va., before joining the staff of International Nickel Co. His activities and professional interests have included alloy steels, ordnance and welding. With Mr. H. J. French, he received in 1940, the Lincoln Gold Medal Award of the American Welding Society for his paper with French entitled "Weld Hardening of Carbon and of Alloy Steel."

• **Earl S. Patch** has been named sales manager of Henry L. Crowley & Co., Inc., West Orange, N. J., manufacturers of the Crolite line of steatite, high-frequency iron cores, and powder-metal parts and bearings. Formerly an executive of the Moraine Products Division of General Motors in Dayton, Mr. Patch is an outstanding authority in the field of powder metallurgy.

• **Bernard N. Brockman** has been made vice-president and general sales manager of the R. K. LeBlond Machine Tool Co., Cincinnati. For the past eight years Mr. Brockman has been in charge of the Company's Chicago office. Prior to the opening of this office, he was with the LeBlond representative, at that time, the Federal Machinery Sales Co., for 16 years. **Donald Whitacre** will succeed Mr. Brockman in charge of the Chicago office. Mr. Whitacre has been with the LeBlond organization for 17 years and in the Chicago office since it was opened in 1935.

• **H. E. Engelbaugh** has been appointed assistant general superintendent, Campbell plant, Youngstown Sheet & Tube Co.; **W. H. Yeckley** has been named assistant superintendent, Brier Hill plant, and **T. A. Cleary**, superintendent, open hearth department, Brier Hill plant. Other promotions and appointments include **M. S. Gettig**, superintendent, seamless tube mills, Campbell plant; **C. R. Coburn**, assistant superintendent, finishing division, seamless tube mills, Campbell plant; **T. A. Mullaly**, superintendent, butt-weld and lap-weld mills, Campbell plant; **J. B. Brunot, Jr.**, assistant superintendent, butt-weld and lap-weld mills, Campbell plant; **G. B. Curl**, assistant supervisor, industrial relations department, and **B. J. Hogan**, assistant supervisor, industrial relations department.

• **Claude J. Neville** has been appointed vice-president and treasurer of the C. O. Bartlett & Snow Co., Cleveland. Mr. Neville has been with the company since 1906, was elected works manager in 1925 and has been a vice-president since 1941.

# MACHINE TOOLS

. . . Sales, Inquiries and Market News

## Renegotiation Proceedings to Be Investigated

### Cleveland

• • • Renegotiation of contracts is providing machine tool builders and dealers with headaches that are growing into major proportions. As far as is known at present, there has been only one dealer that has been given a clean slate in this matter, which at present is gaged by the fact that his cancelled check to Washington has been returned. Several other builders and dealers have already sent checks to Washington following renegotiation proceedings, but as yet have not been able to determine definitely whether or not the checks have been cashed.

Meanwhile, members of the industry that have not completed renegotiations are likely to hold back for a while, pending investigations of renegotiating procedure by a Congressional committee. These investigations are scheduled to start within the next week or ten days, but no one will even hazard a guess as to their outcome. It is likely that some manufacturers in this area will be called to testify at the hearings.

The downward trend in new orders and shipments of machine tools that started with the turn of the year was arrested during March, when both orders and shipments showed an increase. Shipments during the month were valued at about \$126,000,000, as compared with \$114,000,000 in February and \$117,000,000 in January. The all-time high in shipments was recorded in December, 1942, when they were valued at close to \$132,000,000.

This break in the downward trend is not regarded as significant of any revitalization in machine tool orders and shipments that will last for any prolonged period. A considerable proportion of new orders was, in fact, the result of clean-up buying to round out manufacturing facilities in many plants with war contracts. This is a temporary respite and will probably exhaust itself quickly, if it has not already done so.

Meanwhile, dealers and builders are beginning good "old-fashioned" selling campaigns. Some builders have requested their dealers to outline sales programs for the remainder of the year, anticipating that current business is not of sufficient volume to carry through for long. One builder indi-

cated that 30-day deliveries could be made on some of its major products, and is seeking new sales outlets and trying to determine dealer activities.

Then, too, machine tool accessory equipment is becoming more plentiful. Selling efforts have spurted on such products as pneumatic bar feeds to replace hand feeds on some "victory" models and dust catchers for grinding equipment. These and other similar items are making up more and more of the total number of sales of manufacturers and dealers. Being for the most part small and comparatively inexpensive items, however, volume has to be tremendous to compare in dollar value with major products.

### Machine Tool Production Holds; Backlogs Diminish

Cincinnati

• • • The district machine tool market is adhering strongly to its accepted task of producing tools as rapidly as possible, and no new feature has developed. Backlogs, while still of very substantial proportions are being whittled away so that, unless some unforeseen contingency arises, builders generally feel that

### Employer Favored In WLB Decision

Washington

• • • One of the few decisions favorable to an employer was handed down by the War Labor Board last Saturday. The case involved an occupational reclassification dispute between the Bethlehem Steel Co. and the CIO Marine and Shipbuilding Workers Union.

The WLB Shipbuilding Commission, by a vote of four to three, denied the union's request for reclassification of 10 occupations in the steel company's eight Atlantic Coast yards. The denied increase to \$1.20 an hour have applied to the following occupations: painters, burners, erectors, riggers, crane operators, drillers, riveters, wood caulkers, chippers and compressor men. Hourly rates now range from \$1.03 to \$1.20.

during this year order and shipment dates will come closer together. New ordering, however, indicates that the industry is not in for a sharp production in new business for some time in the future, since current bookings are about equal to normal plant operations. Material procurement seems to be improving and previous complaints over the difficulty in obtaining all the necessary items to fabricate machine tools are not as numerous as in previous months.

The man power situation, of course, continues to be an important problem, but it has not yet reached the stage of affecting operations seriously.

### "Electrochemical Drill"

#### Removes Broken Tools

Bendix, N. J.

• • • Removal of broken drills and taps from nearly completed aluminum castings, upon which many costly man-hours have been spent and which would otherwise be scrap, is being achieved by a new form of "electrochemical drill," developed by two young engineers at the Eclipse-Pioneer division of Bendix Aviation Corp. A suggestion by an employee paved the way for laboratory research which resulted in the design of elaborate equipment which is expected to save many vital parts damaged by tool breakage.

The apparatus consists of a funnel-like device housing a copper tube which is placed over the broken part to set up an electrochemical action which disintegrates the broken tool and leaves the hole or thread intact. This new process does its job within specified tolerances on a variety of parts tested thus far.

### Woodmere Charged by OPA With Price Violation

Detroit

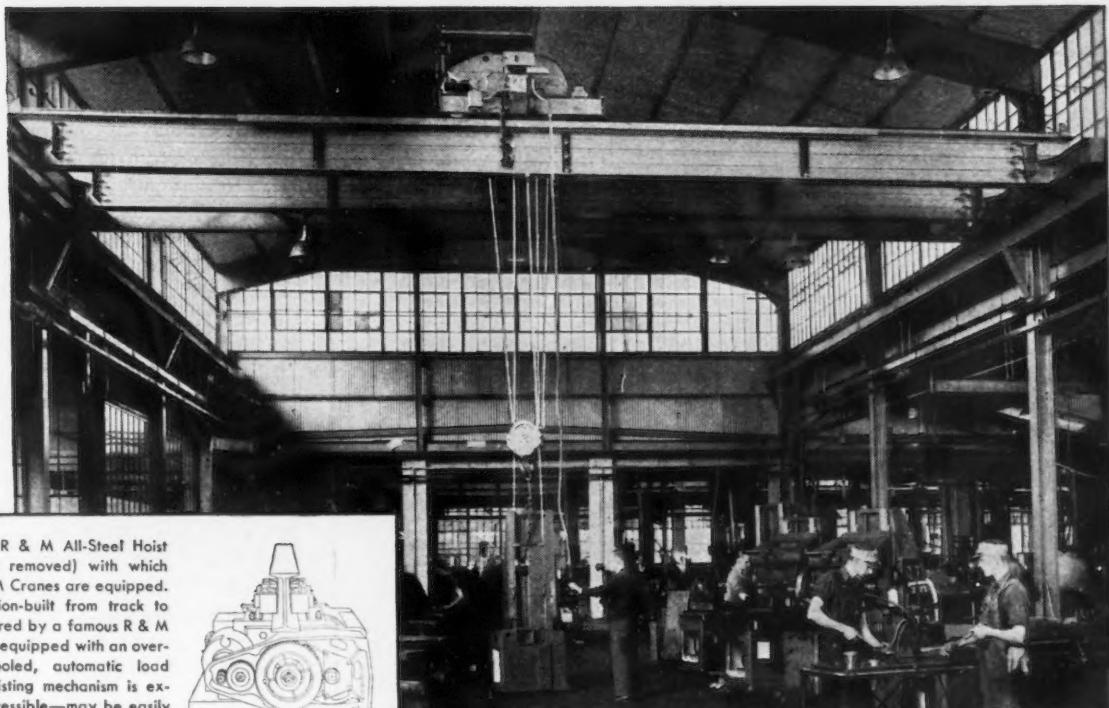
• • • Woodmere Scrap Iron & Metal Co. was charged with improper scrap classification, thereby violating ceiling price levels, in an injunction suit filed by the OPA in Federal Court at Detroit.

It was charged that an illegal brokerage fee of 50c. a ton was levied on shipments to these three companies. This 50c. charge was said to violate OPA ceiling prices of \$20 a ton for the scrap involved.

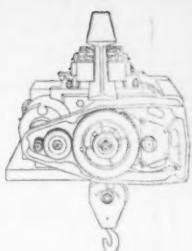
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This is the R & M All-Steel Hoist (with cover removed) with which many R & M Cranes are equipped. It is precision-built from track to hook, powered by a famous R & M Motor, and equipped with an oversize, oil-cooled, automatic load brake. Hoisting mechanism is extremely accessible—may be easily withdrawn when cover is removed. Compact design provides low headroom and maximum lift.



This R & M 10-ton, 45'-span, 3-motor, floor-control crane is speeding work in a prominent machine tool assembly plant. It is equipped with a two-speed, pendant push-button control hoist.

Where's the bottleneck in your war-production setup? Whether it's in moving heavy assemblies inside the plant, or in loading or unloading railroad cars, R & M Cranes can help you increase production by fast lifting and conveying and by saving manpower for other vital work.

Depending on the size of the cranes you need, we can make delivery in three to six months—the longer period necessary on larger types. And whichever model you choose in our line, from  $\frac{1}{2}$  ton to 25 tons in capacity, you have the assurance of performance, dependability and economy proved in every industry in the country during the past 14 years.

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# NON-FERROUS METALS

... Market Activities and Prices

## Two Aluminum Alloy Patents Expire

• • • Aluminum Co. of America has announced the expiration of two of its patents\* covering heat treatment

\* U. S. Patents Nos. 1,508,556 and 1,572,487.

of aluminum alloy castings. The patents involved are particularly important to the aircraft industry in connection with the casting of high strength structural parts, structural fittings, crank cases, cylinder heads,

and small engine parts.

Two types of castings are involved—one an aluminum base alloy casting containing silicon; the other an aluminum base alloy casting containing between 3 and 5.5 per cent copper. In both cases, a solution heat treatment is used—with or without a subsequent aging treatment.

Procedure involves heating the castings to a temperature just under the melting point of the metal (950 deg. to 1000 deg. F. depending on the alloy) and holding the casting at this temperature for a sufficient length of time to permit the soluble constituents of the alloy to go into solid solution. The casting is then quenched, usually in water, and then artificially aged at an intermediate temperature (about 310 deg. F.)

Licenses under a number of unexpired patents of Aluminum Co. of America relating to the heat treatment of aluminum base alloy castings are available through sales offices of the company. Such licenses are royalty free for the duration of the war. Complete information regarding heat treatments covered by the expired patents is at the disposal of interested parties, and booklets containing detailed data pertaining to the various methods of heat treatment involved are available to all licensees.

## Report to Shareholders

Toronto

• • • In an address to shareholders of the International Nickel Co. of Canada, Ltd., Robert C. Stanley, chairman and president, commented on the expansion program of the company. A \$35,000,000 expansion project has been under way for some time to increase nickel production of the company to 50,000,000 lb. per year over the 1940 production rate, and has reached the point where production is up to the expected schedule. No financial aid from the Government or from banks was used for this program.

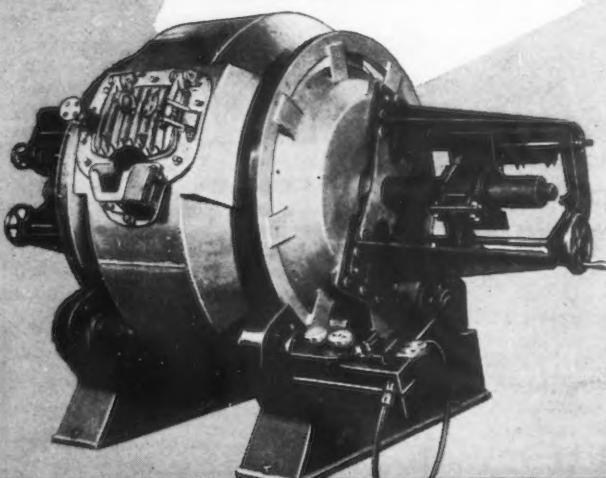
Capital expenditures in 1942, principally for the expansion program, were \$12,009,497, comparable with \$11,739,041 during 1941. However, such disbursements in 1943 are expected to show a substantial decrease and will probably not exceed \$9,000,000.

While there continues to be what seems an insatiable demand for nickel, there has been, Mr. Stanley said, a



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Detroit Furnaces insure rapid melting speed, low metal losses, less labor and saving in floor space. With this furnace you can run a variety of mixtures, 1 or 2 heats an hour, large or small. For increased production at lowest net cost and unequalled operating flexibility, this versatile melting unit simply cannot be beaten. Write for facts.



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KÜHLMAN ELECTRIC COMPANY • BAY CITY MICHIGAN

## NON-FERROUS METALS

### Brass, Wire Mills Ask May Allocations Cut

• • • Allocations of copper to brass and wire mills for the month of May were in many cases greater than the amount requested by the companies. The mills have requested WPB to reduce these enlarged allocations since they fear being left with large inventories after the war.

general misconception that there is an acute shortage of nickel. The facts are that, while production facilities have been strained, essential deliveries have all been made and no shutdowns of essential war production are known to have occurred due to failure of nickel supply. Furthermore, in recent months the situation has materially improved, resulting from increased nickel production, the accelerated return of nickel bearing scrap to steel mills, and the constructive conservation measures that have been adopted by government and industry.

Further work has been done in providing facilities to refine the bessemer output of the Falconbridge Nickel Mines, Ltd., and certain nickel bearing materials supplied by the Metals Reserve Co. Arrangements also are pending to treat nickel ore from several small Canadian properties on a toll basis, and, although these individual tonnages will be small, the aggregate of nickel thus obtained will be helpful.

Manpower shortages have hit the International Nickel Co., affecting not only mining, smelting, refining, and rolling mill divisions, but also offices, laboratories, and technical personnel. Canada released miners from gold camps to the nickel mines, and the employment of more than 700 women in various operations in Canada, as well as many in Great Britain and the United States, has helped. Employment at the end of 1942 was 23,098 as compared with 18,123 at the beginning of the war and 11,325 in 1929.

Commenting briefly on post war markets, Mr. Stanley stated that while many war-time uses of today will become peacetime uses of tomorrow, sufficient new applications will persist to offset former peacetime uses lost to competitive substitutes such as plastics and other metals and alloys.

### Premium for Small Mines

• • • A special additional premium is now available under the premium

price program, limited to small copper mines which produced less than 2000 tons of copper during 1942 and which require increased revenue to obtain maximum production. Each individual case will be considered independently by the quota committee, premium price plan for copper, lead and zinc; and payment of a special additional premium at a rate to be fixed for each mine on production in excess of a special quota will be made by Metals Reserve Co. on the basis of recom-

mendations made by the quota committee and approved by Metals Reserve.

### New Deputy Now Acting Director

• • • George C. Heikes has resigned as director of the WPB Zinc Division to become affiliated with the Olin Corp., East Alton, Ill. Platt C. Benedict, deputy director, who was named to succeed Walter C. Page, will serve as the acting director until the vacancy is filled.

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# SCRAP

... Market Activities and Prices

## Metallics "Over the Top", Says Grace

### New York

• • • E. G. Grace, president of Bethlehem Steel Corp., said last week in a press conference that he foresaw no stringency in the scrap situation and

declared that we are "over the top" so far as metallics are concerned. This statement was based on a satisfactory scrap supply plus the assistance of new blast furnace capacity.

• • • Shipments of iron and steel scrap to the consuming mills during the first two months of 1943 amounted to 31.3 per cent of the first half-year quota for 1943, the Salvage Division announced last week.

In February, 1,995,000 net tons of iron and steel scrap were shipped to consumers, a decrease of 83,000 net tons from the 2,078,000 net tons shipped during January. Compared with shipments for the same month a year ago, however, February, 1943, shipments were slightly higher, mills having received 1,992,000 net tons in February, 1942.

Consumers' inventory continued to decline in February and at the end of the month amounted to 6,205,000 net tons, a drop of 24,000 net tons from January.

### New Dollar and Cents Scrap Ceiling Set By OPA

#### Washington

• • • OPA established dollar and cents prices for tool steel scrap on Tuesday with the issuance of Regulation 379 effective May 10. Five grades of segregated scrap are distinguished by the varying amounts of contained tungsten and molybdenum above a minimum of 1 per cent tungsten and 1½ per cent molybdenum with or without cobalt.

Grade 1, with a tungsten content of 12 per cent or more including the 18-4-1 type of high speed steel scrap carries a maximum price of \$1.80 a lb. contained tungsten, in the form of solids. Other tungsten types are priced at \$1.60 and \$1.25 a lb. in the form of solids, while grades 4 and 5 molybdenum bearing scrap are at a maximum of 12½ and 13½c. a lb. Lower maximum prices are prescribed for segregated drillings and turnings and for unsegregated scrap.

Dealer and quantity differentials are provided by the regulation. Also, a premium is provided for cobalt content of 3 per cent or more. However, if the cobalt content is more than .50 per cent or less than 3 per cent a penalty is prescribed. Penalties are also provided for nickel and copper contaminations in excess of .25 per cent each. The regulation provides a spark test for segregation and a formula for assisting dealers in determining the percentage of contained metal in the scrap.

### AMPCO CASE HISTORIES



### AMPCO METAL Chosen by 60 Leaders Because of Proven Quality

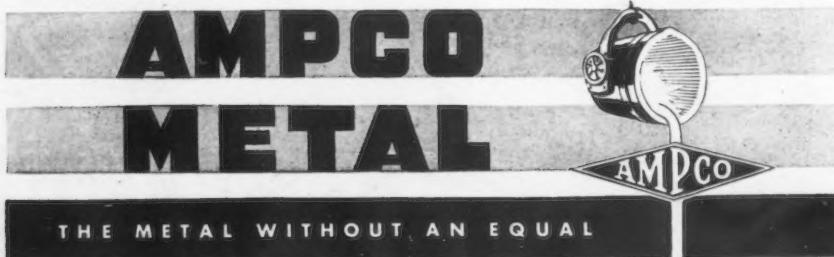
The aircraft industry—staffed by metallurgists and engineers with a keen perception of quality—uses Ampco Metal because experience has proved the ability of this alloy to outperform other bronzes. Over 60 aircraft and equipment manufacturers are Ampco customers. Most U.S. combat planes—bombers, fighters, interceptor-pursuit ships—are Ampco-equipped, evidence of the desirability of this bronze. Only the best materials go into combat planes which must perform their missions and get safely back.

The critical selection of materials and alloys by aircraft designers is engaging the attention of all industry. Perhaps you also have equipment parts subject to unusual stress and wear. The use of Ampco bronze undoubtedly can produce results that are a credit to you—enabling you to overcome metal fatigue, wear, and failure in these critical parts... Suggest the use of Ampco Metal to your key men. Write today for "File 41—Engineering Data Sheets."

### AMPCO METAL, INC.

DEPARTMENT IA-5

MILWAUKEE, WISCONSIN



## SCRAP PRICES

### IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)										ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES											
BASIC OPEN HEARTH GRADES					BLAST FURNACE GRADES					Low Ph. s.					Heavy Structural and Plate		Foundry Steel				
No. 1 & 2 Hvy. Melt.	Unbaled*				Mixed Bundles	Machine Shop	Borings and Turnings	Cast Iron Borings	Shoveling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punch- ings Plate Scrap	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crank- shfts	Free Axle and Sulphur	Heavy Phos.	All-y Turn. Electric First Furnace Cut Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton.....	\$20.00	\$15.00	\$15.00	\$16.00	\$17.00	\$17.50	\$25.00	\$22.50	\$21.50	\$22.00	\$22.50	\$21.50	\$22.00	\$21.00	\$18.00	\$19.50	\$21.00				
Cleveland, Middlefield, Cincinnati, Portsmouth.....	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50				
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point..	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75				
Ashland, Ky.....	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50				
Buffalo, N. Y.....	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25				
Bethlehem, Pa.; Kokomo, Ind.....	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25				
Duluth, Minn.....	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00				
Detroit, Mich.....	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85				
Toledo, Ohio.....	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50				
St. Louis, Mo.....	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50				
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburg, Cal.; San Francisco.....	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	19.50	19.00	19.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00		
Minnequa, Colo.....	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.50	19.00	17.50	14.50	16.00	17.50				
Seattle, Wash.....	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.50	15.00	12.50	14.00	15.50				

\* Baled turnings are \$5 per gross ton higher.

**BUNDLES:** Tin can bundles are \$4 below dealers' No. 2 bundles  
No. 3 bundles are \$2 less than No. 1 heavy melting.

AT NEW YORK city or Brooklyn, the maximum shipping point price is \$15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is \$15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of \$6.66 per ton.

**SWITCHING CHARGES:** Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Clayton, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 34c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c.; \*At Cincinnati, for basic open hearth grades, foundry steel and auto springs and crankshafts, deduct 80c. per ton.

**PITTSBURGH** basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport. Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakland, Cal.

**MAXIMUM** prices of inferior grades shall continue to bear same differential below corresponding grades as existed during the period Sept. 1, 1940, to Jan. 31, 1941. Superior grades cannot be sold at a premium without approval of OPA. Special preparation charges in excess of the above prices are banned. Whenever any electric furnace or foundry grades are purchased for open hearth or blast furnace use, prices may not exceed the prices above for the corresponding open hearth grades.

**MAXIMUM SHIPPING POINT PRICE**—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing

point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton\*, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.\* For exceptions see official order.

**UNPREPARED SCRAP:** For unprepared scrap, maximum prices shall be \$3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made \$4) less maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge \$2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

Maximum price of all scrap in a vehicle is that of the lowest price grade in the shipment. This limitation does not apply to vessel shipments if grades are segregated.

Where scrap is to undergo preparation prior to its arrival at the point of delivery, such scrap is not at its shipping point, as that phrase is defined above, until after preparation has been completed. For special preparation charges, consult official order.

**CHEMICAL BORINGS:** No. 1 (new, clean, containing not more than 1 per cent oil), \$1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), \$2 less than No. 1 heavy melting. If loaded in box cars add 75c.

**UNPREPARED CAST IRON SCRAP**—Except for heavy breakable cast, unprepared scrap is given a price ceiling of \$2.50 per ton less than the maximum prices for the corresponding grade of prepared cast iron scrap. Where scrap is to undergo preparation prior to arrival at the point of delivery, such scrap is not considered at shipping point until preparation is completed.

Consumers of cast scrap may pay the shipping point price plus established charge for transporting the scrap to their planes. In the case of deliveries by truck, the cast scrap buyer must obtain from the seller a certification, made out to OPA.

\*At Memphis 50c.: Great Lakes ports \$1; New England \$1.25.

RAILROAD SCRAP							CAST IRON SCRAP							Group A		Group B		Group C		
Scrap Rails							Group A							Group B		Group C				
No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	3 ft. and Under	2 ft. and Under	18 in. and Under		No. 1 cupola cast.....													
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown.....	\$20.50	\$21.50	\$23.00	\$23.50	\$23.75	\$24.00	Clean auto cast.....								\$18.00	\$19.00	\$20.00			
Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown.....	21.00	22.00	23.50	24.00	24.25	24.50	Unstripped motor blocks.....								18.00	19.00	20.00			
Chicago, Philadelphia, Sparrows Pt., Wilmington, Birmingham, Los Angeles, San Francisco.....	19.75	20.75	22.25	22.75	23.00	23.25	Stove Plate.....								15.50	16.50	17.50			
Buffalo.....	20.25	21.25	22.75	23.25	23.50	23.75	Heavy Breakable Cast.....								17.00	18.00	19.00			
Detroit.....	18.85	19.85	21.35	21.85	22.10	22.35	Charging Box Size Cast.....								15.50	16.50	17.50			
Duluth.....	19.00	20.00	21.50	22.00	22.25	22.50	Misc. Malleable.....								17.00	18.00	19.00			
Kansas City, Mo.....	17.00	18.00	19.50	20.00	20.25	20.50									20.00	21.00	22.00			
Kokomo, Ind.....	19.25	20.25	21.75	22.25	22.50	22.75														
Seattle.....	15.50	16.50	18.00	18.50	18.75	19.00														
St. Louis.....	18.50	19.50	21.00	21.50	21.75	22.00														

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C: States not named in A and B: switching district of Kansas City, Kan., Mo.

# Comparison of Prices . . .

Advances Over Past Week in Heavy Type; Declines in *Italics*.

[Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	May 4, 1943	Apr. 27, 1943	Apr. 6, 1943	May 5, 1942	Pig Iron: (Per Gross Ton)	May 4, 1943	Apr. 27, 1943	Apr. 6, 1943	May 5, 1942
Hot rolled sheets.....	2.10	2.10	2.10	2.10	No. 2 fdy., Philadelphia	\$25.89	\$25.89	\$25.89	\$25.89
Cold rolled sheets.....	3.05	3.05	3.05	3.05	No. 2, Valley furnace	24.00	24.00	24.00	24.00
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50	No. 2, Southern Cin'ti	24.68	24.68	24.68	24.68
Hot rolled strip.....	2.10	2.10	2.10	2.10	No. 2, Birmingham	20.38	20.38	20.38	20.38
Cold rolled strip.....	2.80	2.80	2.80	2.80	No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Plates.....	2.10	2.10	2.10	2.10	Basic, del'd eastern Pa.	25.39	25.39	25.39	25.39
Plates, wrought iron.....	3.80	3.80	3.80	3.80	Basic, Valley furnace	23.50	23.50	23.50	23.50
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00	Malleable, Chicago†	24.00	24.00	24.00	24.00
Tin and Terne Plate: (Dollars Per Base Box)					Malleable, Valley	24.00	24.00	24.00	24.00
Tin plate, standard cokes	\$5.00	\$5.00	\$5.00	\$5.00	L. S. charcoal, Chicago	31.34	31.34	31.34	31.34
Tin plate, electrolytic	4.50	4.50	4.50	4.50	Ferromanganese‡	135.00	135.00	135.00	120.00
Special coated mfg. ternes	4.30	4.30	4.30	4.30					

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

‡For carlots at seaboard.

Bars and Shapes: (Cents Per Lb.)	May 4, 1943	Apr. 27, 1943	Apr. 6, 1943	May 5, 1942
Merchant bars.....	2.15	2.15	2.15	2.15
Cold finished bars.....	2.65	2.65	2.65	2.65
Alloy bars.....	2.70	2.70	2.70	2.70
Structural shapes.....	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars.....	4.40	4.40	4.40	4.40

Wire and Wire Products: (Cents Per Lb.)	May 4, 1943	Apr. 27, 1943	Apr. 6, 1943	May 5, 1942
Plain wire.....	2.60	2.60	2.60	2.60
Wire nails.....	2.55	2.55	2.55	2.55

Rails:	(Dollars Per Gross Ton)
Heavy rails.....	\$40.00
Light rails.....	40.00

Semi-Finished Steel: (Dollars Per Gross Ton)	May 4, 1943	Apr. 27, 1943	Apr. 6, 1943	May 5, 1942
Rerolling billets.....	\$34.00	\$34.00	\$34.00	\$34.00
Sheet bars.....	34.00	34.00	34.00	34.00
Slabs.....	34.00	34.00	34.00	34.00
Forging billets.....	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00

Wire Rods and Skelp: (Cents Per Lb.)	May 4, 1943	Apr. 27, 1943	Apr. 6, 1943	May 5, 1942
Wire rods.....	2.00	2.00	2.00	2.00
Skelp (grvd).....	1.90	1.90	1.90	1.90

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 182 to 186.

## Composite Prices . . .

### FINISHED STEEL

	HIGH	LOW		HIGH	LOW		HIGH	LOW
1943....	2.25513c.,	2.25513c.,	\$23.61	\$23.61	\$19.17	\$19.17	\$19.17	\$19.17
1942....	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17	19.17	19.17
1941....	2.43078c.,	2.43078c.,	\$23.61, Mar. 20	\$23.45, Jan. 2	\$22.00, Jan. 7	\$19.17, Apr. 10		
1940....	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9		
1939....	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16		
1938....	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7		
1937....	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 9		
1936....	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9		
1935....	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29		
1934....	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25		
1933....	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3		
1932....	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5		
1931....	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29		
1930....	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9		
1929....	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3		

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

### PIG IRON

	May 4, 1943	Apr. 27, 1943	Apr. 6, 1943	May 5, 1942
	23.61	a Gross Ton		
	23.61	a Gross Ton		
	23.61	a Gross Ton		
	23.61	a Gross Ton		

### SCRAP STEEL

	May 4, 1943	Apr. 27, 1943	Apr. 6, 1943	May 5, 1942
	\$19.17	a Gross Ton		
	\$19.17	a Gross Ton		
	\$19.17	a Gross Ton		
	\$19.17	a Gross Ton		

Four-and-a-half  
Backrigid  
bearing  
insert  
comb  
in P



Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

# VIBRATIONLESS

because of Four-Sided Frame  
and Backing-Plate Blade Support



## PEERLESS BLADE CONTROL ASSURES PRECISION CUTTING AT HIGHER SPEEDS . . .



Four-Sided Frame is distortion-proof and surrounds the blade and the work. Backing-Plate Blade Support gives rigidity to blade assembly. Eight bearings, with hardened and ground inserts, absorb all vibration. This combination of features is found only in Peerless Metal Cutting Saws.

Even when cutting tubing or pipe, Peerless Metal Cutting Saws cut faster, with no hogging, less waste of material and less blade wear. Cutting SAE 1050 billets and other stock, Peerless will average from 5 to 7 sq. in. per minute and the blade is good for 2000 sq. in. When working stainless or aluminum alloys, the fact that as little as 1/16 in. of

material is cut away, results in minimum waste of stock.

The vibrationless performance of Peerless Metal Cutting Saws assures *faster precision cutting at lower cost*. Mail the coupon for estimate of cutting time for your toughest job.

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**Peerless**  
THE ONLY METAL CUTTING SAW  
WITH FOUR-SIDED SAW-FRAME AND BACKING-PLATE

Fast ACCURATE Sawing DEMANDS PEERLESS BLADE CONTROL

PEERLESS MACHINE COMPANY, Dept. IA-543, Racine, Wis.

Mail cutting time estimate for.....

- Mail catalog on Hydraulic type Saw for High Production Cutting
- Mail catalog covering Vertical type used for Die Block Work
- Mail catalog on Mechanical type Saw for production cutting
- Mail catalog on general utility and maintenance Saws

Company.....

Individual.....

Street.....

City.....

State.....

# Prices of Finished Iron and Steel . . .

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, reductions, and in most cases freight absorbed to meet competition. Delivered prices do not reflect new 3 per cent tax on freight rates.

Basing Point ↓ Product	DELIVERED TO														
	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	Detroit	New York	Philadelphia
<b>SHEETS</b>															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.22¢	2.35¢	2.28¢
Cold rolled <sup>1</sup>	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.17¢	3.41¢	3.39¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.75¢	3.68¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.47¢	3.73¢	3.69¢
Long ternes <sup>2</sup>	3.80¢		3.80¢									4.55¢		4.18¢	4.14¢
<b>STRIP</b>															
Hot rolled <sup>3</sup>	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.22¢	2.48¢	
Cold rolled <sup>4</sup>	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)				2.92¢	3.18¢		
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢						2.58¢		
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)				3.07¢	3.33¢		
<b>TIN MILL PRODUCTS</b>															
Coke tin plate, base box	\$5.00	\$5.00	\$5.00						\$5.10				5.38¢	5.34¢	
Electrolytic tin plate, box	\$4.50		\$4.50												
Black plate, 29 gage <sup>5</sup>	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ <sup>12</sup>		3.39¢	
Mfg. ternes, special box	\$4.30	\$4.30	\$4.30						\$4.40						
<b>BARS</b>															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			(Duluth = 2.25¢)	2.52¢	2.80¢	2.27¢	2.51¢	2.49¢	
Rail steel <sup>6</sup>	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.52¢	2.80¢				
Reinforcing (billet) <sup>7</sup>	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		2.52¢	2.55¢ <sup>13</sup>	2.27¢	2.40¢		
Reinforcing (rail) <sup>7</sup>	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.52¢	2.55¢ <sup>13</sup>	2.27¢	2.49¢		
Cold finished <sup>8</sup>	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)				3.01¢	2.99¢	
Alloy, hot rolled	2.70¢	2.70¢			2.70¢			(Bethlehem, Massillon, Canton = 2.70¢)				2.82¢			
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢						3.47¢			
<b>PLATES</b>															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.35¢	2.47¢	2.65¢	2.33¢	2.30¢	2.155¢	
Floor plates	3.35¢	3.35¢								3.72¢	4.00¢		3.73¢	3.69¢	
Alloy	3.50¢	3.50¢				(Coatesville = 3.50¢)				3.97¢	4.15¢		3.71¢	3.60¢	
<b>SHAPES</b>															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)		2.47¢	2.75¢		2.28¢	2.22¢	
<b>SPRING STEEL, C-R</b>															
0.26 to 0.50 Carbon	2.80¢			2.80¢				(Worcester = 3.00¢)							
0.51 to 0.75 Carbon	4.30¢			4.30¢				(Worcester = 4.50¢)							
0.76 to 1.00 Carbon	6.15¢			6.15¢				(Worcester = 6.35¢)							
1.01 to 1.25 Carbon	8.35¢			8.35¢				(Worcester = 8.55¢)							
<b>WIRE<sup>9</sup></b>															
Bright <sup>10</sup>	2.60¢	2.60¢		2.60¢	2.60¢			(Worcester = 2.70¢)		3.10¢			2.94¢		
Galvanized								add proper size extra and galvanized extra to bright wire base, above.							
Spring (High Carbon)	3.20¢	3.20¢		3.20¢				(Worcester = 3.30¢)		3.70¢			3.54¢		
<b>PILING</b>															
Steel sheet	2.40¢	2.40¢				2.40¢				2.95¢			2.74¢		

<sup>1</sup> Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. <sup>2</sup> Unassorted 8-lb. coating. <sup>3</sup> Widths up to 12 in. <sup>4</sup> Carbon 0.25 per cent and less. <sup>5</sup> Applies to certain width and length limitations. <sup>6</sup> For merchant trade. <sup>7</sup> Prices for straight length material only, from a producer to a consumer. Functional discount of 25c. per 100 lb. to fabricators. <sup>8</sup> Also shafting. For quantities of 20,000 to 39,999 lb. <sup>9</sup> Carload lot to manufacturing trade. <sup>10</sup> These prices do not apply if the customary means of transportation (rail and water) are not used. <sup>11</sup> Boxed. <sup>12</sup> Portland and Seattle price. San Francisco price is 2.50¢. <sup>13</sup> This bright wire base price to be used in figuring annealed and bright finish wires, commercial spring wire and galvanized wire.

**GOVERNMENT CEILINGS**—Price Schedule No. 6 issued April 16, 1941, governs steel mill prices; Price Schedule No. 49 governs warehouse prices which are on another page of this issue.

**EXCEPTIONS TO PRICE SCHEDULE No. 6**—On hot rolled carbon bars, Phoenix Iron Co. may quote 2.35¢. at established basing points; Calumet Steel division of Borg Warner may quote 2.35¢, Chicago, on bars from its 8-in. mill; Joslyn Mfg. Co. may quote 2.35¢, Chicago base. On rail steel bars Sweets Steel Co. may quote 2.35¢, f.o.b. mill. On hot rolled sheets, Andrews Steel Co. may quote for shipment to Detroit area on Middletown base. On galvanized sheets, Andrews Steel may quote 3.75¢, at established basing points. On hot rolled strip, Joslyn Mfg. Co. may quote 2.30¢, Chicago base. On plates, Granite City Steel Co. may quote 2.35¢, f.o.b. mill, and Central Iron & Steel Co. may quote 2.20¢, f.o.b. basing points. On shapes, Phoenix Iron Co. may quote 2.30¢, established basing points and 2.50¢, Phoenixville for export. On rail steel merchant bars, Eckels-Nye Corp. may charge 2.40¢. On tubing, South Chester Tube Co. may price Gulf or Pacific Coast all-rail shipments and shipments west of Harrisburg on basis of f.o.b. Chester. On lend-lease sales to eastern seaboard, Sheffield Steel Co. and Colorado Fuel & Iron Corp. may sell f.o.b. mill. **SEMITIFINISHED STEEL**—Follansbee Steel Corp. may sell forging billets at \$49.50 f.o.b. Toronto; Continental Steel Corp. may sell Acme Steel Co. at \$34 for rerolling billets plus extras and freight; Ford Motor Co. may sell rerolling billets at \$34 f.o.b. Dearborn; Andrews Steel Co. may sell forging billets at \$50 at established basing points and slabs at \$41; Empire Sheet and Tin Plate may sell slabs at \$41 at established basing points and sheet bars at \$39 f.o.b. mill; on lend-lease sales Northwestern Steel & Wire Co. may charge \$41 per gross ton f.o.b. mill for rerolling billets; on lend-lease sales Wheeling Steel Corp. may charge \$36 per ton for small billets, f.o.b. Portsmouth and \$37 per ton for sheet bars f.o.b. Portsmouth; Laclede Steel Co. on semifinished sales for lend-lease shipped to eastern seaboard may use Chicago basing point prices f.o.b. Alton and Madison, Ill. **ALLOY STEEL BARS**—Texas Steel Co. may use Chicago base f.o.b. Fort Worth.



MORGAN 60-TON 60'-0"  
SPAN CONVERTER AISLE CRANE

BUILT BY MORGAN

*Engineering*

● Illustrated is a Morgan heavy duty mill type crane in a converter aisle. It is equipped with fabricated welded trolley and bridge trucks; hydraulic bridge brake and anti-friction bearings. Trolley is of the gear box type having two 60-ton identical hoists using plain motors with flexible couplings. An auxiliary girder is provided for supporting the center cage. As a safety feature, special relays are incorporated in the control circuit to limit the torque of the hoist motors when "pulling collars." On such crane equipment for copper smelter service, the stability of Morgan Engineering has long been well established.



THE MORGAN ENGINEERING CO.  
ALLIANCE, OHIO. 1420 Oliver Building, Pittsburgh

DESIGNERS • MANUFACTURERS • CONTRACTORS • BLOOMING MILLS • PLATE MILLS • STRUCTURAL MILLS • ELECTRIC  
WELDING CRANES • CHARGING MACHINES • INGOT STRIPPING MACHINES • SOAKING PIT CRANES • ELECTRIC WELDED  
STRUCTURATION • LALLE CRANES • STEAM HAMMERS • STEAM HYDRAULIC FORGING PRESSES • SPECIAL MACHINERY FOR STEEL MILLS

## PRICES

### SEMI-FINISHED STEEL

*For exceptions, see preceding page*

#### Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are \$2.25 higher; f.o.b. Duluth, billets only, \$2 higher. Delivered prices do not reflect new per cent tax on freight rates.

*Per Gross Ton*

Rerolling	\$34.00
Forging quality	40.00
Alloy Steel: Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton	\$54.00

#### Shell Steel

*Per Gross Ton*

3 in. to 12 in.	\$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00
Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.	
Prices delivered Detroit are \$2.25 higher.	

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

#### Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

*Per Gross Ton*

Open hearth or bessemer	\$34.00
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#### Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

*Per Lb.*

Grooved, universal and sheared	1.90c.
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#### Wire Rods

(No. 5 to 9/32 in.)

*Per Lb.*

Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

#### TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

*Base per lb.*

High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57 1/2c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi, 3c. higher.

#### CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

#### Chromium-Nickel Alloys

No. 304 No. 302

Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

#### Straight-Chromium Alloys

No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.
Bars	18.50c.	19.00c.	22.50c.
Plates	21.50c.	22.00c.	25.50c.
Sheets	26.50c.	29.00c.	32.50c.
Hotstrip	17.00c.	17.50c.	24.00c.
Cold st.	22.00c.	22.50c.	32.00c.

#### Chromium-Nickel Clad Steel (20%)

No. 304	18.00c.*
Sheets	19.00c.

\*Includes annealing and pickling.

#### N. E. STEELS (Hot Rolled) Extras for Alloy Content

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar Strip	Billets, Blooms and Slabs	Bars and Bar Strip	Billets, Blooms and Slabs
NE 1330	.28/.33	1.60/1.90	.040	.040	.20/.35				.10c	\$2.00		
NE 1335	.33/.38	1.60/1.90	.040	.040	.20/.35				.10	2.00		
NE 1340	.38/.43	1.60/1.90	.040	.040	.20/.35				.10	2.00		
NE 1345	.43/.48	1.60/1.90	.040	.040	.20/.35				.10	2.00		
NE 1350	.48/.53	1.60/1.90	.040	.040	.20/.35				.10	2.00		
NE 8020	.18/.23	1.00/1.30	.040	.040	.20/.35				.10/.20	.45	9.00	.95c \$19.00
NE 8442*	.40/.45	1.30/1.60	.040	.040	.20/.35				.30/.40	.90	18.00	1.40 28.00
NE 8613	.12/.17	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25 25.00	
NE 8615	.13/.18	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25 25.00	
NE 8617	.15/.20	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25 25.00	
NE 8620	.18/.23	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.16/.26	.75	15.00	1.25 25.00	
NE 8630	.28/.33	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25 25.00	
NE 8635	.33/.38	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25 25.00	
NE 8637	.35/.40	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25 25.00	
NE 8640	.38/.43	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25 25.00	
NE 8642	.40/.45	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25 25.00	
NE 8645	.43/.48	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25 25.00	
NE 8650	.48/.53	.75/1.00	.040	.040	.20/.35	.40/.60	.40/.70	.15/.25	.75	15.00	1.25 25.00	
NE 8720	.18/.23	.70/.90	.040	.040	.20/.35	.40/.60	.40/.70	.20/.30	.80	16.00	1.30 26.00	
NE 9255	.50/.60	.70/.95	.040	.040	1.80/2.20				.40c	8.00		
NE 9260	.55/.65	.75/1.00	.040	.040	1.80/2.20				.40	8.00		
NE 9262	.55/.65	.75/1.00	.040	.040	1.80/2.20	.20/.40			.65	13.00		
NE 9415	.13/.18	.80/1.10	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30c \$26.00	
NE 9420	.18/.23	.80/1.10	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30 26.00	
NE 9422	.20/.25	.80/1.10	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30 26.00	
NE 9430	.28/.33	.90/1.20	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30 26.00	
NE 9435	.33/.38	.90/1.20	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30 26.00	
NE 9437	.35/.40	.90/1.20	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30 26.00	
NE 9440	.38/.43	.90/1.20	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.80	16.00	1.30 26.00	
NE 9442	.40/.45	1.00/1.30	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.85	17.00	1.35 27.00	
NE 9445	.43/.48	1.00/1.30	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.85	17.00	1.35 27.00	
NE 9450	.48/.53	1.20/1.50	.040	.040	.40/.60	.20/.40	.20/.50	.08/.15	.85	17.00	1.35 27.00	
NE 9537*	.35/.40	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.70	.15/.25	1.20	24.00	1.70 34.00	
NE 9540*	.38/.43	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.70	.15/.25	1.20	24.00	1.70 34.00	
NE 9542*	.40/.45	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.70	.15/.25	1.20	24.00	1.70 34.00	
NE 9550*	.48/.53	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.70	.15/.25	1.20	24.00	1.70 34.00	
NE 9630	.28/.33	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.60		.80	16.00	1.30 26.00	
NE 9635	.33/.38	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.60		.80	16.00	1.30 26.00	
NE 9637	.35/.40	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.60		.80	16.00	1.30 26.00	
NE 9640	.38/.43	1.20/1.50	.040	.040	.40/.60	.40/.60	.40/.60		.80	16.00	1.30 26.00	
NE 9642	.40/.45	1.30/1.60	.040	.040	.40/.60	.40/.60	.40/.60		.85	17.00	1.35 27.00	
NE 9645	.43/.48	1.30/1.60	.040	.040	.40/.60	.40/.60	.40/.60		.85	17.00	1.35 27.00	
NE 9650	.48/.53	1.30/1.60	.040	.040	.40/.60	.40/.60	.40/.60		.85	17.00	1.35 27.00	

\*Recommended for large sections only. Note: The extras shown above are in addition to a base price of 2.70c. per 100 lb. on finished products and \$54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished.

When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, \$5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

#### ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh) Per Lb.

Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.

# LADISH

*quality*

# DROP FORGINGS



Ladish leadership in drop forgings springs from the sharp focus of its superior experience and technical talent on the constant target, "Quality." Unexcelled facilities under constant metallurgical control produce forgings meeting uniformly, the most exacting engineering requirements.



**LADISH DROP FORGE CO.**

PLANT AND GENERAL OFFICES: CUDAHY, WISCONSIN

TO MARK PROGRESS

## WHEN EQUIPMENT HAS THE

Shakes

**W**ITH process industries driving toward ever higher production of vital materials—acid handling equipment must not fail. And in many cases Tellurium Lead is helping to keep it on the job.

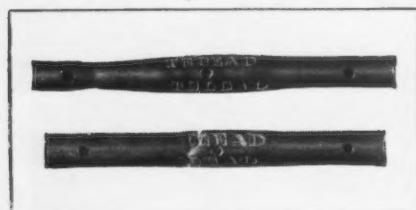
\* \* \*

One possible source of trouble in such equipment is vibration. The resultant dynamic or fatigue stresses, acting in combination with corrosion, are destructive to acid-resistant linings or coverings—more destructive than either factor alone.

To help combat this stress-corrosion, Tellurium Lead offers two important properties. First, it has the corrosion resistance for which lead is well known. Second, it has improved fatigue resistance. When tested in a Haigh "fatigue" testing machine, it exhibited a 60% greater endurance limit than lead without tellurium.

\* \* \*

Another condition which sometimes causes trouble in acid processing is the repeated, drastic change in temperature to which



**Strengthens under Stress:** A section of Tellurium Lead pipe (top) and a section of regular lead pipe (bottom) were stamped with their respective names and pulled out at equal rates in a tensile testing machine. Note how the Tellurium Lead pipe developed strength where it was work hardened by the stamping, whereas the other lead was weakened . . . and fractured.

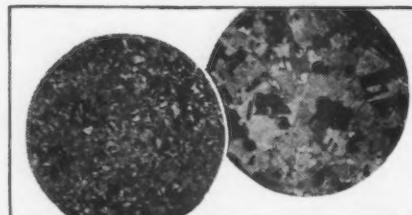
tanks for heating and cooling are subjected. The continued expansion and contraction, with accompanying movement or working of the lining, may create severe stresses, resulting in failure. Some users report that, in certain cases of this kind, the use of Tellurium Lead results in definitely longer lining life.

This advantage of Tellurium Lead has been attributed, among other things, to its ability to *work harden*—to toughen and increase in tensile strength as it is worked.

This work-hardening property of Tellurium Lead tends to be of value in applications where lead must be bent, stretched or hammered—as in turnover points, elbows, flanges, coils and joints—as well as in equipment which must withstand vibration.

\* \* \*

Another factor in Tellurium Lead's resistance to corrosion under severe conditions of stress and heat is undoubtedly a result of its generally finer, more uniform grain



**Finer Grain Structures:** Photomicrographs of Tellurium Lead (left) and ordinary lead (right), showing the generally finer, more uniform grain structure brought about by the addition of tellurium. Another significant point: In laboratory tests extruded strips of Tellurium Lead, annealed at 150°C for six months, showed no grain enlargement. Metallurgists agree that freedom from grain growth means less danger of rapid corrosion at elevated temperatures.

structure, shown in the photomicrographs below. As a result, the surface of Tellurium Lead sheet and pipe tends to be smoother, with less possibility of pitting and local corrosion.

\* \* \*

Tellurium Lead of our manufacture is time-tested St. Joe chemical lead alloyed with a small quantity of tellurium. It is available in sheet or pipe form, or fabricated in coils for heating and cooling purposes.

For further information address the nearest Company branch listed below.

**USERS "TELL" THE DIFFERENCE**

"We find Tellurium Lead stands up much better than other lead under vibration. The trouble we encountered (cracking of the corrosion-resistant covering on rayon spinning machines) has been entirely eliminated."

"We are using Tellurium Lead regularly in our steam jet mixer heads, as we feel it greatly improves resistance to crystalline fracture under conditions of vibration or mechanical stress."

"For the last two years we have purchased all our requirements in Tellurium Lead. We find a considerable advantage in resistance to vibration crystallization."

"We find this material has a greatly improved resistance to so-called vibration crystallization."

**NATIONAL LEAD COMPANY**—New York, Baltimore, Buffalo, Chicago, Cleveland, Cincinnati, St. Louis, National-Boston Lead Co., Boston; John T. Lewis & Bros. Co., Philadelphia; National Lead & Oil Co. of Penna., Pittsburgh; Georgia Lead Works, Atlanta; American Lead Corp., Indianapolis; Master Metals, Inc., Cleveland; The Canada Metal Co., Ltd., Toronto, Montreal, Winnipeg, Vancouver.



# TELLURIUM LEAD